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MECHANICAL ENGINEERING

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Avoidable Waste in Car Operation—The Container Car, By W. C. Sanders

Material Handling an Important Factor in Elimination of Waste, By H. V. Coes

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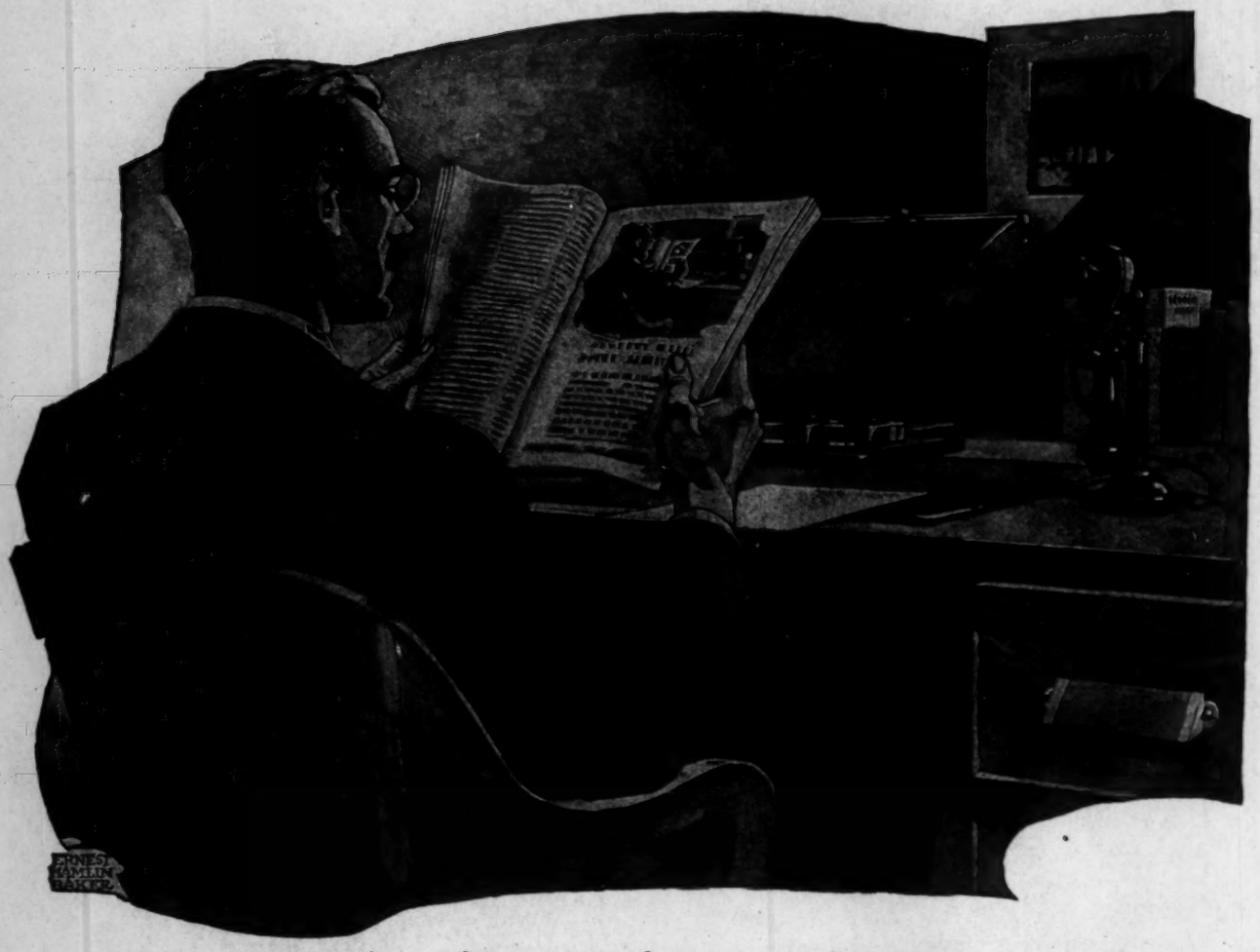

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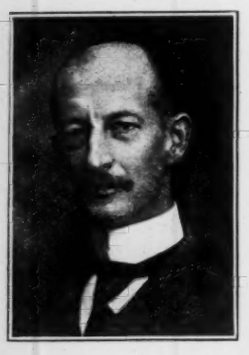
Contributors and Contributions

Boiler and Furnace Economy



D. S. JACOBUS

Dr. David S. Jacobus, who writes on Boiler and Furnace Economy in this issue, at the present time acts as advisory engineer for The Babcock and Wilcox Company. Graduating from Stevens Institute in 1884 he was appointed assistant professor of experimental mechanics. The full professorship of experimental mechanics and engineering physics was conferred upon him in 1897 and he served in this capacity until 1906, when his relationship with The Babcock and Wilcox Company began. He received the honorary degree of Doctor of Engineering from Stevens Institute in 1906. Dr. Jacobus has written many scientific papers on engineering subjects and has been exceedingly active in engineering societies, especially in The American Society of Mechanical Engineers, which he served as president in 1915–16 and previously as manager and vice-president.

Heat Balance in Steam Power Plants

Four papers giving valuable data on steam power plant heat balance are published in this issue of MECHANICAL ENGINEERING.

Ernest L. Hopping, who writes of the Delaware Station, is engineer of station mechanical design and construction for the Philadelphia Electric Company, having served with the company since 1911. His previous experience was gained mainly with various machine and engine constructors in Philadelphia where he worked on the design of locomotive parts, electric cranes, and stationary engines.

Charles W. E. Clarke, of the Dwight P. Robinson Company, presents data from Colfax Station. Mr. Clark received his early experience in Chicago. He designed several power and refrigerating plants for Armour and Company, and as chief draftsman for Sargent and Lundy was in charge of design, specification and construction work for installations aggregating 100,000 kw. in and near Chicago. From 1907 to 1910 he was in charge of mechanical engineering in the New York electrical zone for the New York Central Lines, and thereafter was associated with Stone and Webster in charge of a large number of power developments. Since 1919 Mr. Clarke has been associated with the Dwight P. Robinson Company.

John H. Lawrence, one of the co-authors of the Hell Gate Station paper, is a 1909 Cornell graduate and was in the service of the New York Edison Company in design and installation capacities until 1918. Since late in 1918 he has been in the employ of the Thomas E. Murray Co., at present holding the position of engineering manager.

Walter H. Keenan, Mr. Lawrence's collaborator, was graduated from Cornell in 1911 and was employed in laboratory research and design work by the New York Edison Company until 1919. He is a present assistant engineering manager for Thomas E. Murray Co.

Wastes in Handling Material

Harold V. Coes, who presents a timely paper on the principles involved in handling material economically, is manager for Ford, Bacon and Davis at Philadelphia. Mr. Coes, a graduate of Massachusetts Institute of Technology in 1906, has had broad experience in design and operation. He has been with Ford, Bacon and Davis since 1917.

On the Art of Milling

JOHN AIREY

Prof. John Airey and Carl J. Oxford present an exceedingly interesting method of investigating the rational action of a milling cutter. Professor Airey occupies the chair of Engineering Mechanics at the University of Michigan. He was born in England and after four years' apprenticeship in various English and French machine shops entered the University of London, from which he was graduated in 1910. After a year as assistant superintendent of a Swiss machine shop he came to America as instructor in engineering mechanics at Michigan, later acting as assistant professor and receiving the full professorship in 1919. During the war for nine months Professor Airey served as assistant inspector of munitions for the British Government and for two years was in charge of the engineering and mechanical department for the R. and V. Wagner Ordnance Company. He has made many contributions to the technical press.

Mr. Oxford was born in Norway and came to the United States in 1909. After two years in the engineering department at the University of Michigan, he served as tool draftsman with the Packard Motor Car Company, Dodge Brothers, and Nordyke and Marmon until 1916, when he became designing engineer for the Wilt Twist Drill Company. He entered the service of the National Twist Drill and Tool Company of Detroit in 1917 and is now chief engineer.

CARL J. OXFORD

Wastes in the Machine Shop

James A. Smith, who contributes a paper on Salvaging Industrial Wastes, printed in this issue and to be presented at the Machine Shop Session of the A.S.M.E. Annual Meeting, is general superintendent of the Schenectady Works of the General Electric Company, with which concern he has been associated since January 1910. Previous to that he had eleven years' experience with the Pratt and Whitney Company and six years' service as superintendent of the Dutchess Tool Works at Fishkill-on-the Hudson.

MECHANICAL ENGINEERING

Volume 43 December, 1921 Number 12

Boiler and Furnace Economy

By D. S. JACOBUS,[1] NEW YORK, N. Y.

That it is possible to effect material savings in power plants is evident, according to the author, when it is considered that fifty or even a hundred per cent more fuel is burned in some cases than would be required by plants of the best economy. It does not follow, however, that it would pay to replace all plants of low efficiency by those having a higher efficiency. There are many factors which must be taken into consideration before deciding that a new investment is warranted, and each case must be considered individually in order to determine whether or not it will pay to replace an existing plant by one of more economical type, or to add apparatus to increase the efficiency.

The present paper accordingly deals with such questions as when it will pay to use economizers in a new plant; the most economical rating at which to operate a boiler; limitations imposed on efficiency by inability of furnace brickwork to withstand temperatures available with many classes of fuel; furnace volume and length of flame travel; where air heaters are of especial advantage; importance of employing properly trained men for boiler operation; information afforded by flue-gas analysis, etc., etc.

The author points out in closing that furnace and boiler design must be coordinated in order to secure the best results. It is impossible to separate the boiler efficiency from the efficiency of the stoker and furnace in such a way that the value obtained for the former will depend solely on the construction of the boiler and not be influenced through the construction of the stoker and furnace The stoker and furnace efficiency is influenced by the delayed or secondary combustion between the boiler tubes and this cannot be included in any analysis, neither can the loss due to excess air be correctly divided between the boiler and furnace.

THERE has been a steady improvement in the economy of power plants, on account of the increase in fuel costs and to keep pace with the advance in the art. Particular attention is now being given to savings in view of the economic struggle which appears to be before us. That material savings can be effected in power plants is plain when it is considered that 50 or even 100 per cent more fuel is burned in some cases than would be required by plants of the best economy. It does not follow, however, that it would pay to replace all plants of low efficiency by those having a higher efficiency. There are many factors which must be taken into account before deciding that a new investment is warranted and each case must be considered by itself in order to determine whether or not it will pay to replace an existing plant by one of more economical type, or to add apparatus to increase the efficiency. Adding an economizer will ordinarily add to the thermal efficiency; the same applies to an air heater, but in considering all features it may be found that the character of the load, the class of operation, and the fuel conditions are such that it will not pay to install an economizer or an air heater.

When It Will Pay to Use Economizers in a New Plant

In determining whether it will pay to use economizers in a new plant the problem should not be approached by comparing the efficiency of a boiler with that of the same boiler with an economizer added to it. The proper way is to compare the results to be expected from boilers best suited for the service without the addition of economizers, with the results to be expected from the best combination of boilers and economizers. It will sometimes be found for certain load conditions that a larger boiler properly designed and baffled will give better commercial returns, all features considered, than a smaller boiler with an economizer, or for that matter, than any boiler that can be selected with an economizer. In the case of an old plant, the question of whether or not it will pay to add economizers to the boiler is a simpler one to answer than for a new plant, as the added efficiency due to the economizers may be readily computed on the basis of the known flue-gas temperatures, gas weights, etc., but here again the load conditions must be taken into account, as well as the fact that there will be an increased cost of upkeep and added complication through the necessity of installing an induced-draft apparatus. For peak-load service where the peaks are of short duration, say an hour or so a day, it does not in most cases pay to install economizers on all of the boilers. A good arrangement may be secured for some classes of service by adding economizers to some of the boilers and operating them at a more nearly uniform load than the rest of the boilers, the boilers that have no economizers being held in reserve and cut in during the peak-load periods. Another case where it does not pay to apply economizers is where boilers are used for stand-by service. Where the operation is more or less continuous it pays in most cases to use economizers. The cost of fuel is a governing factor. The increase in fuel costs during the last few years has caused economizers to be used more generally than formerly and we are approaching more closely to European practice in the number of boilers fitted with economizers.

Increasing the Efficiency by Adding to Height of Boiler

In designing a boiler for use without an economizer additional efficiency may be secured by adding to the height of the boiler. Adding to the height of the boiler so as to increase it from, say, 14 tubes high to 20 tubes high, will result in a considerable increase in efficiency with but little increase in the draft loss. In many instances the higher boilers may be operated with natural draft at the desired capacity, thereby eliminating the added complication of the induced-draft apparatus that would be required for economizers. Of course, it would be impossible to operate a high boiler of the sort with natural draft at as high a percentage of rating as a lower boiler, as the flue-gas temperature at a given rating would be considerably lower than with the lower boiler and this would reduce the amount of draft available from the stack.

Wrought-steel economizers are coming into use to a greater extent than formerly. We have learned how to prevent interior corrosion in a wrought-steel economizer by reducing the oxygen content of the feedwater with as low a temperature of feedwater as can be enployed in a cast-iron economizer. To avoid exterior corrosion through the condensation of moisture from the flue gases, the temperature of the feedwater to the economizer must be kept above a temperature of about 120 deg. fahr., and for most work 140 deg. fahr. is preferable, as this allows for some leeway in case the water is fed intermittently. There is more difficulty through exterior corrosion in intermittent service than where the service is more or less continuous, as soot which collects on the outside of the economizer is apt to become moist during the time that the economizers are down or are being started up, and the presence of moisture makes the soot from certain fuels highly corrosive. Coals having a high sulphur content give the most trouble through exterior corrosion, and with such coals the temperature at which the water is fed to the economizers should be somewhat higher than for coals having but little sulphur.

An Individual Economizer for Each Boiler

It is becoming more general practice to use an individual economizer for each boiler and not to install connections for by-pass-

[1] Advisory Engineer, The Babcock & Wilcox Co. Mem. Am.Soc.M.E.

For presentation at the Annual Meeting, New York, December 5 to 9, 1921, of The American Society of Mechanical Engineers. Copies of the paper may be obtained gratis on application. All papers are subject to revision.

ing the flue gases around the economizer. A by-pass connection as a rule allows some leakage of the hot gases around the economizer and causes a continual loss of efficiency. Omitting the by-pass connections is also advantageous in simplifying the operation and lessening the chance of trouble with the economizers.

The efficiency obtainable from the boilers is not the only factor that governs the efficiency of the plant as a whole, especially under variable load conditions. The variation in the load must naturally be taken care of either by operating the boilers at widely varying capacities or by carrying banked boilers which are cut in at the time of the peak loads. It can be readily appreciated that should the boilers at a plant be limited to a capacity of 200 per cent of rating, a greater number of boilers would have to be in continuous operation or a greater number of boilers would have to be held in reserve for cutting in during the peak-load interval than were it possible to operate the boilers at the peak-load intervals at 300 or 400 per cent of rating. By arranging to operate the boilers at 300 to 400 per cent of rating they would ordinarily not give as high an efficiency at the lower ratings as the boilers having stokers especially fitted for operating at the lower ratings, but when it comes to the efficiency of a plant as a whole, a better efficiency would ordinarily be secured by the use of boilers capable of being operated at the higher ratings even though these boilers might be, say, 2 per cent less efficient at a given rating than the boilers having a more limited capacity. The obtainable capacity is therefore an important factor, especially when the load is variable. In the event of extreme variations which come at rare intervals it can be readily seen that the ability to carry the load far offsets any loss in economy when running at the higher load, and it is these elements that have caused the capacity at which boilers are run for peak-load service to be advanced to 300 or even 500 per cent of rating. High capacities of the sort should of course not be attempted without the very best of feedwater and the highest class of attendance.

The Most Economical Rating at Which to Operate a Boiler

A question often arises as to what is the most economical capacity or rating at which a boiler should be run. This cannot be answered in a general way as it depends on the load conditions as well as the class and cost of the fuel. The economical rating is naturally influenced by the presence or absence of economizers and the service to which the boilers are put. Where there are short peak-load periods the greatest commercial economy is usually secured by operating the boilers to as high a capacity as can be secured during these periods. Each case must be considered by itself and the fuel economy worked out for the actual conditions of service. The effect of the additional cost of upkeep must naturally be considered. The general practice in this country is to drive boilers at a higher rating than is done in European practice, and the stress of war conditions has undoubtedly led to a number of plants being run beyond the point of the best commercial efficiency. The fact remains, however, that boilers are being run at higher and higher capacities in our modern power plants and the tendency seems to be upward rather than downward.

With a uniform load, or a practically uniform load, the problem of determining the most economical capacity at which to drive boilers is a simpler one than with a fluctuating load, but even here the point of best economy from a thermal standpoint is considerably lower than the point at which the boilers should be operated to secure the best commercial economy.

Limitations Imposed on Efficiency by Furnace Brickwork

For securing the highest efficiency, the furnace temperature should be the maximum that can be maintained, and combustion should be completed within the furnace chamber. The furnace brickwork employed today will fail if saturated with heat at the full temperature available with many classes of fuel. In furnace design, therefore, some efficiency must be sacrificed in most cases in order to maintain the furnace brickwork and keep the cost of repairs within a reasonable figure. Should it be possible to secure refractories for furnace construction that could be brought up to the full available temperature, and that would withstand the effect of erosion of the gases and be free from spalling, the art of furnace design would be considerably changed. As the art stands today, most of the thickness of the brickwork must be cooled to a temperature below, say, 2200 deg. fahr., in order that the bricks or tiles will carry the load imposed on them. To accomplish this a sufficient amount of the heat absorbed by the brickwork must be dissipated either through radiation or convection. Where furnaces are operated under a suction which causes the cool air to be drawn inward through the brickwork there is a cooling effect which serves to prevent overheating, whereas if they are operated under a pressure there is a tendency for the hot gases to leach outward and overheat the brickwork. The difference between running with a slight suction of, say, 0.1 in. water column and a plus pressure within the furnace may make all the difference between successful operation and having a lot of trouble. Should it be possible to operate with a plus pressure and maintain the brickwork irrespective of the temperature to which it would be raised, more economical results could be secured in most cases through the elevation of the furnace temperature. The exception would be where the elevation of temperature would interfere with the combustion; for example, with some kinds of coal too high a temperature might fuse the ash and clinker and cause the coal to mat down on the grate so as to greatly increase the air resistance through the fuel bed and reduce the available capacity. Again, should it be possible to bring the brickwork up to the full furnace temperature, arches could be used for certain purposes in furnace design where they cannot be used at present.

Brickwork will fail by plastic deformation before it reaches the melting point. The greater the load carried by the brick, the more apt it is to fail. Fireclay brick of the best quality ordinarily obtainable begin to show plastic deformation under a load of 20 lb. per sq. in. at from 2200 to 2400 deg. fahr. Reduction to a load of 10 lb. per sq. in. will increase the permissible temperatures about 200 deg. fahr. As furnace temperatures considerably higher than this exist with certain grades of fuel and stoker practice, say, 2700 to 3000 deg. fahr., as a limit, it is apparent that the necessity of maintaining the brickwork below the temperature of the furnace is a vital one. First-class clay brick have a fusion point slightly above 3100 deg. fahr., and they yield through plastic deformation long before they fuse. This emphasizes the importance of conducting proper tests for plastic deformation.

In ordinary furnace design the walls and arches are heated on one side only in order that the brickwork may be maintained at a lower temperature than the full temperature of the furnace. Arches will give trouble if heated on both sides which would not give trouble if subjected to the same amount of heat on one side only. This sometimes makes necessary the use of double arches, one directly above the other, with a small amount of air admitted between them for ventilating and cooling. Where battery walls are heated on both sides they must be made thick enough to conduct the heat from the hotter to the cooler parts of the walls to a sufficient extent to keep the wall at a temperature below that which will cause trouble. A wall of a given thickness that would give good service as a battery wall might fail for the same fuel and combustion conditions if used for supporting combustion arches within the furnace, as the heat would not be conducted away from the supporting wall to the extent that it would in the case of a battery wall. A supporting wall of the sort should be used between combustion arches only in cases where a low grade of fuel is burned which does not result in high temperatures, or it should be ventilated.

Points to be Considered in Designing an Efficient Furnace

To consume the combustible gases within the furnace chamber there should be a proper length of flame travel before the gases strike the tubes and a sufficient furnace volume. Furnace volume and length of flame travel are not, however, the only elements that must be considered in designing an efficient furnace, as there must be mingling action within the furnace to cause any consumed combustible gases to reach the excess air. It is possible in some forms of furnaces for a lane of gases containing excess air to pass entirely through the boiler to the uptake. To secure the best efficiency the furnace should be of such a form as to prevent a laning action of the sort. Gases containing excess air will ordinarily mingle more readily with the hotter gases containing unconsumed combustible matter if they are made to travel over and above the hotter gases within the furnace, as this leads to an eddying action

through the greater density of the cooler gases containing the excess air. Where two lines of stokers are used with the dumping plates at the middle line of the furnace, the latter should be made high enough to allow the lean gases which come at the middle of the furnace to form eddying currents with the hotter gases and to thereby search out the combustible matter in the hotter gases. In some cases a swirling action can be brought about which increases the turbulence and adds to the efficiency of the combustion. In a furnace of this sort the stokers should be set so that the dumping plates come at right angles to the horizontal projection of the tubes, because if set at 90 deg. to this position the quality of the gases from side to side of the boiler would not be uniform.

In the burning of gaseous, liquid, and powdered fuel a laning action, or an irregular mingling of the fuel and air, may lead to pulsations within the setting, which may become so severe as to limit the capacity at which the boiler can be operated. The remedy consists in obtaining a proper distribution of the air and fuel. The velocity at which the air is admitted is an important element and there is usually less trouble experienced where a forced blast is used than under natural-draft conditions.

There has been a gradual increase in furnace volumes. In the burning of blast-furnace gas we now furnish at least 2 cu. ft. of furnace volume per rated boiler horsepower, which is over double that used in the older practice. For some coal-fired boilers fitted with forced-blast, chain-grate stokers we are supplying about 4 cu. ft. per rated horsepower. The gas-fired boilers are operated at about 200 per cent of rating as a maximum and the coal-fired boilers at over 300 per cent, so that in each case we are supplying about 1 cu. ft. of furnace volume per maximum developed horsepower. In the case of powdered-fuel furnaces the furnace volume of the latest installation is about 2 cu. ft. per developed horsepower. These figures are for the larger furnaces used in stationary practice, and in some instances with smaller furnaces a higher capacity may be developed per cubic foot of furnace volume. It is seldom, however, that over 2 hp. is developed in stationary practice per cubic foot of furnace volume. In marine practice, where the furnaces are made of the smallest size that will give good results, as high as 5 to 6 hp. may be developed in both coal- and oil-fired boilers per cubic foot of furnace volume. High capacities of the sort with relatively small furnaces can only be secured with the cleanest of feedwater, and it is certainly advantageous to use the larger furnaces in stationary practice, as by so doing it is easier to operate without an undue amount of tube troubles, the trouble through the collection of slag on the exterior of the tubes will be diminished, and the combustible gases can be more thoroughly consumed within the furnace chamber.

The effect of the absorption of radiant heat on the boiler tubes should be considered in designing a furnace. With certain fuels such as blast-furnace gas, wet wood or bagasse, where the highest attainable temperature can be carried by the brickwork, it is best to absorb but little radiant heat in order to maintain a high furnace temperature. With the stronger fuels it is necessary to absorb a considerable amount of the radiant heat in order to prevent the collapse of the brick work or an undue amount of deterioration. Few realize how great a proportion of the heat may be absorbed by a boiler as radiant heat. In underfeed-stoker practice, with the baffle arrangement ordinarily offered with Babcock & Wilcox boilers, the absorption of radiant heat with the boiler operated at its normal rated capacity is over 60 per cent of the total heat absorption. Exposing more or less of the boiler surface to the direct radiant heat of the fire with the stronger fuels has a comparatively small influence on the efficiency, as exposing a greater amount of surface reduces the furnace temperature which offsets some of the gains, and any increase in the heat absorbed through direct radiation is also counterbalanced to an extent by the diminution of the amount of heat absorbed through conduction. Ordinarily, the higher the furnace temperature, the higher the efficiency. Higher furnace temperatures, however, lead to increased cost of brickwork maintenance, especially when the boilers are operated at high ratings, and for a strong fuel it usually pays to expose a considerable proportion of the heating surface of the boiler to the direct action of the radiant heat.

A furnace to give economical results at high ratings involves special problems in caring for the expansion of the brickwork and especial care in the construction of buckstays for holding the brickwork in alignment. The general tendency in large furnace walls which are highly heated is to bulge inward toward the fire, and unless some means are provided to prevent this they may collapse. In our present practice we use horizontal rows of bonding tile which are held by cast-iron bulb pieces attached to the buckstays in such a way that the wall can expand in any direction in a generally vertical plane, whereas it is prevented from bulging inward or outward. Another means that may be employed to prevent the walls bulging inward toward the fire is to build them with a camber with a vertical axis, that is, curved slightly with the concave side next the furnace. Still another way is to incline the walls outwardly.

Remedies for Certain Operating Difficulties

In operating at higher ratings difficulties are encountered with some grades of fuel through slag adhering to the boiler tubes and restricting or closing up the passageways for the flow of the gases. The difficulty through slag can be reduced by providing a relatively large area for the flow of the gases on entering the spaces between the tubes and by furnishing access doors through which the slag can be detached from the tubes. An air or steam lance which is used both for cooling the slag and as a rod for striking it to remove any portion that may adhere to the tubes, forms an efficient tool for use in connection with the access doors. The difficulty through slag is essentially a stoker operating difficulty. Carrying a thick fire may result in but little slagging action, whereas this may cause trouble with the stoker itself through clinker. Thinner fires may remedy the stoker difficulty but may result in an excessive amount of slag being deposited on the boiler tubes. With certain grades of coal there will be some accumulation of slag on the boiler tubes with the stokers most carefully operated, and it is advantageous in such cases to provide access doors for removing the slag. Steam-jet blowers serve to remove or to reduce the amount of slag which will collect on the tubes, but are not a complete remedy in all cases.

Troubles through clinker at the sides and front walls of the furnace where underfeed stokers are used is often reduced through admitting air under a blast pressure through a number of openings through the walls at the sides of the fuel bed. The air flows in a layer against the inner face of the wall and prevents the clinker from adhering to the walls. It also serves to partially cool the wall and reduce the erosion of the wall. This method was applied to one of our boilers at Dayton, Ohio, in 1912, and has since been extensively used. A difficulty that arises in some cases is the formation of a clinker which will cause the air admitted under a blast pressure to produce a jet or torch-like action on the furnace walls. This is clearly a stoker operating difficulty. In some cases a torch-like effect of the sort will result in fusing the brick so as to melt out or erode away a part of the wall. The stoker tuyeres may also cause jets of air to be projected against the wall so as to erode away certain parts of the wall.

Where Air Heaters Are of Especial Advantage

Air heaters are of especial advantage where low grades of fuel are burned and it is desirable to increase the furnace temperature. In such cases the increase of efficiency of the boiler or boiler and economizer as a whole may be greater than that corresponding to the amount of heat imparted to the air heaters, as the heated air may increase the efficiency of the combustion to such an extent as to result in a greater gain in the heat absorption than that corresponding to the heat imparted to the air. Of course, the gain through the use of the air heater would be measured by the efficiency of the plant when run respectively with and without the air heater, but the difference obtained in this way might be greater than that corresponding to the amount of heat absorbed by the air heater.

In the case of certain fuels an air heater may not be desirable on account of increasing the trouble with clinkers in the furnace, and also on account of increasing the upkeep of the brickwork. As higher and higher efficiencies are sought for, air heaters will undoubtedly be used to a greater extent in the same way as in the case of economizers. In common with economizers, there may be trouble with air heaters through a sweating action of the gases in

ing the flue gases around the economizer. A by-pass connection as a rule allows some leakage of the hot gases around the economizer and causes a continual loss of efficiency. Omitting the by-pass connections is also advantageous in simplifying the operation and lessening the chance of trouble with the economizers.

The efficiency obtainable from the boilers is not the only factor that governs the efficiency of the plant as a whole, especially under variable load conditions. The variation in the load must naturally be taken care of either by operating the boilers at widely varying capacities or by carrying banked boilers which are cut in at the time of the peak loads. It can be readily appreciated that should the boilers at a plant be limited to a capacity of 200 per cent of rating, a greater number of boilers would have to be in continuous operation or a greater number of boilers would have to be held in reserve for cutting in during the peak-load interval than were it possible to operate the boilers at the peak-load intervals at 300 or 400 per cent of rating. By arranging to operate the boilers at 300 to 400 per cent of rating they would ordinarily not give as high an efficiency at the lower ratings as the boilers having stokers especially fitted for operating at the lower ratings, but when it comes to the efficiency of a plant as a whole, a better efficiency would ordinarily be secured by the use of boilers capable of being operated at the higher ratings even though these boilers might be, say, 2 per cent less efficient at a given rating than the boilers having a more limited capacity. The obtainable capacity is therefore an important factor, especially when the load is variable. In the event of extreme variations which come at rare intervals it can be readily seen that the ability to carry the load far offsets any loss in economy when running at the higher load, and it is these elements that have caused the capacity at which boilers are run for peak-load service to be advanced to 300 or even 500 per cent of rating. High capacities of the sort should of course not be attempted without the very best of feedwater and the highest class of attendance.

THE MOST ECONOMICAL RATING AT WHICH TO OPERATE A BOILER

A question often arises as to what is the most economical capacity or rating at which a boiler should be run. This cannot be answered in a general way as it depends on the load conditions as well as the class and cost of the fuel. The economical rating is naturally influenced by the presence or absence of economizers and the service to which the boilers are put. Where there are short peak-load periods the greatest commercial economy is usually secured by operating the boilers to as high a capacity as can be secured during these periods. Each case must be considered by itself and the fuel economy worked out for the actual conditions of service. The effect of the additional cost of upkeep must naturally be considered. The general practice in this country is to drive boilers at a higher rating than is done in European practice, and the stress of war conditions has undoubtedly led to a number of plants being run beyond the point of the best commercial efficiency. The fact remains, however, that boilers are being run at higher and higher capacities in our modern power plants and the tendency seems to be upward rather than downward.

With a uniform load, or a practically uniform load, the problem of determining the most economical capacity at which to drive boilers is a simpler one than with a fluctuating load, but even here the point of best economy from a thermal standpoint is considerably lower than the point at which the boilers should be operated to secure the best commercial economy.

LIMITATIONS IMPOSED ON EFFICIENCY BY FURNACE BRICKWORK

For securing the highest efficiency, the furnace temperature should be the maximum that can be maintained, and combustion should be completed within the furnace chamber. The furnace brickwork employed today will fail if saturated with heat at the full temperature available with many classes of fuel. In furnace design, therefore, some efficiency must be sacrificed in most cases in order to maintain the furnace brickwork and keep the cost of repairs within a reasonable figure. Should it be possible to secure refractories for furnace construction that could be brought up to the full available temperature, and that would withstand the effect of erosion of the gases and be free from spalling, the art of furnace design would be considerably changed. As the art stands today, most of the thickness of the brickwork must be cooled to a temperature below, say, 2200 deg. fahr., in order that the bricks or tiles will carry the load imposed on them. To accomplish this a sufficient amount of the heat absorbed by the brickwork must be dissipated either through radiation or convection. Where furnaces are operated under a suction which causes the cool air to be drawn inward through the brickwork there is a cooling effect which serves to prevent overheating, whereas if they are operated under a pressure there is a tendency for the hot gases to leach outward and overheat the brickwork. The difference between running with a slight suction of, say, 0.1 in. water column and a plus pressure within the furnace may make all the difference between successful operation and having a lot of trouble. Should it be possible to operate with a plus pressure and maintain the brickwork irrespective of the temperature to which it would be raised, more economical results could be secured in most cases through the elevation of the furnace temperature. The exception would be where the elevation of temperature would interfere with the combustion; for example, with some kinds of coal too high a temperature might fuse the ash and clinker and cause the coal to mat down on the grate so as to greatly increase the air resistance through the fuel bed and reduce the available capacity. Again, should it be possible to bring the brickwork up to the full furnace temperature, arches could be used for certain purposes in furnace design where they cannot be used at present.

Brickwork will fail by plastic deformation before it reaches the melting point. The greater the load carried by the brick, the more apt it is to fail. Fireclay brick of the best quality ordinarily obtainable begin to show plastic deformation under a load of 20 lb. per sq. in. at from 2200 to 2400 deg. fahr. Reduction to a load of 10 lb. per sq. in. will increase the permissible temperatures about 200 deg. fahr. As furnace temperatures considerably higher than this exist with certain grades of fuel and stoker practice, say, 2700 to 3000 deg. fahr., as a limit, it is apparent that the necessity of maintaining the brickwork below the temperature of the furnace is a vital one. First-class clay brick have a fusion point slightly above 3100 deg. fahr., and they yield through plastic deformation long before they fuse. This emphasizes the importance of conducting proper tests for plastic deformation.

In ordinary furnace design the walls and arches are heated on one side only in order that the brickwork may be maintained at a lower temperature than the full temperature of the furnace. Arches will give trouble if heated on both sides which would not give trouble if subjected to the same amount of heat on one side only. This sometimes makes necessary the use of double arches, one directly above the other, with a small amount of air admitted between them for ventilating and cooling. Where battery walls are heated on both sides they must be made thick enough to conduct the heat from the hotter to the cooler parts of the walls to a sufficient extent to keep the wall at a temperature below that which will cause trouble. A wall of a given thickness that would give good service as a battery wall might fail for the same fuel and combustion conditions if used for supporting combustion arches within the furnace, as the heat would not be conducted away from the supporting wall to the extent that it would in the case of a battery wall. A supporting wall of the sort should be used between combustion arches only in cases where a low grade of fuel is burned which does not result in high temperatures, or it should be ventilated.

POINTS TO BE CONSIDERED IN DESIGNING AN EFFICIENT FURNACE

To consume the combustible gases within the furnace chamber there should be a proper length of flame travel before the gases strike the tubes and a sufficient furnace volume. Furnace volume and length of flame travel are not, however, the only elements that must be considered in designing an efficient furnace, as there must be mingling action within the furnace to cause any consumed combustible gases to reach the excess air. It is possible in some forms of furnaces for a lane of gases containing excess air to pass entirely through the boiler to the uptake. To secure the best efficiency the furnace should be of such a form as to prevent a laning action of the sort. Gases containing excess air will ordinarily mingle more readily with the hotter gases containing unconsumed combustible matter if they are made to travel over and above the hotter gases within the furnace, as this leads to an eddying action

through the greater density of the cooler gases containing the excess air. Where two lines of stokers are used with the dumping plates at the middle line of the furnace, the latter should be made high enough to allow the lean gases which come at the middle of the furnace to form eddying currents with the hotter gases and to thereby search out the combustible matter in the hotter gases. In some cases a swirling action can be brought about which increases the turbulence and adds to the efficiency of the combustion. In a furnace of this sort the stokers should be set so that the dumping plates come at right angles to the horizontal projection of the tubes, because if set at 90 deg. to this position the quality of the gases from side to side of the boiler would not be uniform.

In the burning of gaseous, liquid, and powdered fuel a laning action, or an irregular mingling of the fuel and air, may lead to pulsations within the setting, which may become so severe as to limit the capacity at which the boiler can be operated. The remedy consists in obtaining a proper distribution of the air and fuel. The velocity at which the air is admitted is an important element and there is usually less trouble experienced where a forced blast is used than under natural-draft conditions.

There has been a gradual increase in furnace volumes. In the burning of blast-furnace gas we now furnish at least 2 cu. ft. of furnace volume per rated boiler horsepower, which is over double that used in the older practice. For some coal-fired boilers fitted with forced-blast chain-grate stokers we are supplying about 4 cu. ft. per rated horsepower. The gas-fired boilers are operated at about 200 per cent of rating as a maximum and the coal-fired boilers at over 300 per cent, so that in each case we are supplying about 1 cu. ft. of furnace volume per maximum developed horsepower. In the case of powdered-fuel furnaces the furnace volume of the latest installation is about 2 cu. ft. per developed horsepower. These figures are for the larger furnaces used in stationary practice, and in some instances with smaller furnaces a higher capacity may be developed per cubic foot of furnace volume. It is seldom, however, that over 2 hp. is developed in stationary practice per cubic foot of furnace volume. In marine practice, where the furnaces are made of the smallest size that will give good results, as high as 5 to 6 hp. may be developed in both coal- and oil-fired boilers per cubic foot of furnace volume. High capacities of the sort with relatively small furnaces can only be secured with the cleanest of feedwater, and it is certainly advantageous to use the larger furnaces in stationary practice, as by so doing it is easier to operate without an undue amount of tube troubles, the trouble through the collection of slag on the exterior of the tubes will be diminished, and the combustible gases can be more thoroughly consumed within the furnace chamber.

The effect of the absorption of radiant heat on the boiler tubes should be considered in designing a furnace. With certain fuels such as blast-furnace gas, wet wood or bagasse, where the highest attainable temperature can be carried by the brickwork, it is best to absorb but little radiant heat in order to maintain a high furnace temperature. With the stronger fuels it is necessary to absorb a considerable amount of the radiant heat in order to prevent the collapse of the brick work or an undue amount of deterioration. Few realize how great a proportion of the heat may be absorbed by a boiler as radiant heat. In underfeed-stoker practice, with the baffle arrangement ordinarily offered with Babcock & Wilcox boilers, the absorption of radiant heat with the boiler operated at its normal rated capacity is over 60 per cent of the total heat absorption. Exposing more or less of the boiler surface to the direct radiant heat of the fire with the stronger fuels has a comparatively small influence on the efficiency, as exposing a greater amount of surface reduces the furnace temperature which offsets some of the gains, and any increase in the heat absorbed through direct radiation is also counterbalanced to an extent by the diminution of the amount of heat absorbed through conduction. Ordinarily, the higher the furnace temperature, the higher the efficiency. Higher furnace temperatures, however, lead to increased cost of brickwork maintenance, especially when the boilers are operated at high ratings, and for a strong fuel it usually pays to expose a considerable proportion of the heating surface of the boiler to the direct action of the radiant heat.

A furnace to give economical results at high ratings involves special problems in caring for the expansion of the brickwork and especial care in the construction of buckstays for holding the brickwork in alignment. The general tendency in large furnace walls which are highly heated is to bulge inward toward the fire, and unless some means are provided to prevent this they may collapse. In our present practice we use horizontal rows of bonding tile which are held by cast-iron bulb pieces attached to the buckstays in such a way that the wall can expand in any direction in a generally vertical plane, whereas it is prevented from bulging inward or outward. Another means that may be employed to prevent the walls bulging inward toward the fire is to build them with a camber with a vertical axis, that is, curved slightly with the concave side next the furnace. Still another way is to incline the walls outwardly.

Remedies for Certain Operating Difficulties

In operating at higher ratings difficulties are encountered with some grades of fuel through slag adhering to the boiler tubes and restricting or closing up the passageways for the flow of the gases. The difficulty through slag can be reduced by providing a relatively large area for the flow of the gases on entering the spaces between the tubes and by furnishing access doors through which the slag can be detached from the tubes. An air or steam lance which is used both for cooling the slag and as a rod for striking it to remove any portion that may adhere to the tubes, forms an efficient tool for use in connection with the access doors. The difficulty through slag is essentially a stoker operating difficulty. Carrying a thick fire may result in but little slagging action, whereas this may cause trouble with the stoker itself through clinker. Thinner fires may remedy the stoker difficulty but may result in an excessive amount of slag being deposited on the boiler tubes. With certain grades of coal there will be some accumulation of slag on the boiler tubes with the stokers most carefully operated, and it is advantageous in such cases to provide access doors for removing the slag. Steam-jet blowers serve to remove or to reduce the amount of slag which will collect on the tubes, but are not a complete remedy in all cases.

Troubles through clinker at the sides and front walls of the furnace where underfeed stokers are used is often reduced through admitting air under a blast pressure through a number of openings through the walls at the sides of the fuel bed. The air flows in a layer against the inner face of the wall and prevents the clinker from adhering to the walls. It also serves to partially cool the wall and reduce the erosion of the wall. This method was applied to one of our boilers at Dayton, Ohio, in 1912, and has since been extensively used. A difficulty that arises in some cases is the formation of a clinker which will cause the air admitted under a blast pressure to produce a jet or torch-like action on the furnace walls. This is clearly a stoker operating difficulty. In some cases a torch-like effect of the sort will result in fusing the brick so as to melt out or erode away a part of the wall. The stoker tuyeres may also cause jets of air to be projected against the wall so as to erode away certain parts of the wall.

Where Air Heaters Are of Especial Advantage

Air heaters are of especial advantage where low grades of fuel are burned and it is desirable to increase the furnace temperature. In such cases the increase of efficiency of the boiler or boiler and economizer as a whole may be greater than that corresponding to the amount of heat imparted to the air heaters, as the heated air may increase the efficiency of the combustion to such an extent as to result in a greater gain in the heat absorption than that corresponding to the heat imparted to the air. Of course, the gain through the use of the air heater would be measured by the efficiency of the plant when run respectively with and without the air heater, but the difference obtained in this way might be greater than that corresponding to the amount of heat absorbed by the air heater.

In the case of certain fuels an air heater may not be desirable on account of increasing the trouble with clinkers in the furnace, and also on account of increasing the upkeep of the brickwork. As higher and higher efficiencies are sought for, air heaters will undoubtedly be used to a greater extent in the same way as in the case of economizers. In common with economizers, there may be trouble with air heaters through a sweating action of the gases in

depositing moisture and acid on the colder portions, and all of these features should be considered before deciding to use an air heater.

IMPORTANCE OF EMPLOYING WELL-TRAINED MEN FOR OPERATION OF BOILERS

Irrespective of how well a boiler plant may be designed, it will not give the best results unless it is properly operated. The man in charge of the boiler room is the "man behind the gun" when it comes to securing the best obtainable efficiency. The old idea that a man should graduate from the boiler room to the engine room is a mistake, as a good man in the boiler room can increase the efficiency through good operation far more than one in the engine room. Happily more attention is now being paid to this feature, with correspondingly good results.

All of those who have had much to do with increasing the efficiency of power plants know that often the simplest requirements of good practice are disregarded in the operation of boilers, the boilers often being dirty and run with leaky baffles and settings. Even where the boilers and settings are kept in good condition there may be a loss through improper firing. The fireman is often blamed as a factor of fuel waste. The difficulty is seldom with the fireman, but in having nothing to guide the fireman except what might be called his intuition. It is certainly a mistake not to provide proper instruments. This is well appreciated in the larger and best-run power plants, but there is often a lack of instruments that makes it impossible to operate the plant to the best advantage. There is no reason why operating results should not be as good as test results, and this can only be accomplished through installing high-grade indicating and recording apparatus for the guidance of the fireman and operators. The plants of today are of a more complex character than in the past and the success in operating these plants depends in a great measure on the use of the proper instruments and a proper training of the man.

INFORMATION AFFORDED BY FLUE-GAS ANALYSES

In the operation of a plant much is shown by the flue-gas analyses. The flue-gas analyses are not all that govern the efficiency, as much depends on whether or not there is delayed combustion between the tubes of the boiler. It is all wrong to assume that if two boilers are operated with the same average flue-gas analysis and percentage of carbon in the ash that the furnace efficiency is the same in each, as actually there may be a wide difference due to the fact that all of the combustible gases may be consumed in the furnace in one case and not in the other.

A small amount of CO is often present when a high percentage of CO_2 is carried. An analysis with coal firing which indicates 13 per cent of CO_2 and no CO is about equivalent from a heat-loss standpoint, where the flue gases leave boiler and economizer at 500 deg. fahr., to one which gives 15 per cent CO_2 and $^1/_4$ per cent of CO. Again, carrying a high percentage of CO_2 sometimes leads to secondary or delayed combustion between the boiler tubes, thereby involving an additional loss through increasing the temperature of the flue gases. It is important, therefore, in boiler-room practice to make accurate analyses to determine whether or not CO is present in the flue gases and also to avoid too great an amount of delayed combustion between the boiler tubes.

Automatic systems for combustion control are often used to advantage. The supply of fuel is regulated in some cases to meet the demand for steam as well as the amount of air supplied for combustion. Systems where the amount of fuel is automatically regulated are in more general use in oil burning than for coal. In most cases the air supply is regulated to correspond to the fuel burned and to give a proper amount of draft within the furnace, and the fuel supply is hand-adjusted. Such systems quickly regulate the air and draft, and in some cases the fuel as well, to meet changing load conditions, and are especially useful where there is a variable load.

High-class instruments and apparatus for guiding the firemen or controlling the combustion will not of themselves insure good results. Many such devices that would give highly satisfactory results in the hands of a capable man that believes in them would be a failure in the hands of one less capable or one prejudiced against them. Here again all depends on the man in charge, and as the art advances and more complicated apparatus is used in obtaining higher efficiencies, more competent men are required.

NECESSITY OF COORDINATING BOILER AND FURNACE DESIGN TO SECURE BEST RESULTS

Furnace and boiler design must be coördinated in order to secure the best results. It is impossible to separate the boiler efficiency from the efficiency of the stoker and furnace in such a way that the value obtained for the efficiency of the boiler will depend solely on the construction of the boiler and not be influenced through the construction of the stoker and furnace. Many have worked on this problem and the ground has probably been gone over more thoroughly than any other feature in boiler-testing codes. The stoker and furnace efficiency is influenced by the delayed secondary combustion between the boiler tubes and this element can not be included in any analysis, neither can the loss due to excess air be correctly divided between the boiler and furnace. The element of delayed combustion may influence the overall boiler and furnace efficiency, say, 5 or 10 per cent with the same flue-gas analyses. In most proposed methods the stoker and furnace efficiency is based on the analyses of the flue gases and on the amount of unconsumed carbon in the ash, and it can be readily seen that such a basis cannot give reliable results. Should it be possible to accurately express the furnace and stoker efficiency, a purchaser should obtain the same overall economy from his boilers with any arrangement of stokers and furnaces having a given efficiency. There is no method, however, whereby this result could be insured and whereby the purchaser would be protected should he assume that the boiler and furnace efficiency would be an exact measure of the relative advantages of using one or another of the various stokers and furnaces in connection with his boilers.

Stainless steel is an alloy steel containing about 12 to 14 per cent of chromium. It may be hardened in air, oil, or water, and tempered to various degrees of hardness as required for the different purposes for which it is intended. Ordinary carbon tool steel is hardened from a temperature of 760 to 780 deg. cent. for the maximum hardness to be obtained; with stainless steel, however, the temperature for effective hardening is higher, and it is recommended that temperatures between 950 and 1000 deg. cent. be used. This is due to the fact that the phase changes take place at a much higher temperature than in ordinary carbon steels. The difference in hardening temperature can be illustrated by stating that ordinary tool steel may be hardened from a red heat, while stainless steel should be taken to an orange-yellow heat.

Stainless steel may be supplied either in, or to be put in, the hard condition as for cutlery; in the machinable condition as for pump rods, turbine blades, etc., and in the malleable state required for presswork, etc.

Hence it is desirable that engineers should definitely state the purpose for which they desire to employ the material. For the manufacture of cutlery it is supplied in the annealed condition, since the final processes of manufacture include the hardening of the blades. For use in the machined condition it is available in the specially heat-treated condition, complying with the mechanical properties required for specific engineering purposes, thus obviating any necessity for further treatment by the user. For presswork it is produced within such limits of composition and treatment as to insure a satisfactory malleable stainless steel as required for articles as are manufactured from sheet steel, etc.

The most common of corrosive influences—i.e., weathering agents—have little effect on stainless steel. Samples have been exposed to the weather, wet and dry, frost and snow, for many months, and at the end of the time have been perfectly bright and unaffected in any way. Samples have been placed in streams, and after twelve months have still maintained their pristine brightness. Nitric acid, oleic acid, stearic acid, benzol, and petrol are without effect; phosphoric acid in concentrated form has no effect, but 75 per cent solutions give a slight general attack. Citric acid and formic acid cause corrosion to some extent, but for the great majority of liquids tested the steel was unaffected.—*Mechanical World*, Oct. 28, 1921.

On the Art of Milling

By JOHN AIREY,[1] ANN ARBOR, MICH., and CARL J. OXFORD,[2] DETROIT, MICH.

This paper gives particulars of an investigation undertaken at the University of Michigan for the purpose of finding a rational basis for the action of a milling cutter.

It is shown that metal is removed more efficiently with thick chips than with thin chips. It follows from this that, other conditions being equal, including speed and feed per minute, the cutter with the fewest teeth gives the greatest efficiency. However, it is evident that the efficiencies of two cutters with different numbers of teeth are equal provided the table feeds be adjusted so that the same feed per tooth is effected. This gives a definite working theory on the influence of spacing.

It is definitely established that for a given material, tooth shape and sharpness, thickness of chip is the sole criterion of the efficiency with which metal is removed in milling and that increase of spacing over that required for free cutting is a handicap. Present-day high-powered cutters have several times the chip space needed. Limitation of machine power has doubtlessly been the chief factor in giving a false bias to the influence of spacing.

Formulas for determining the number of teeth for a known diameter of cutter and for determining the depth are included in the paper, as well as a geometrical construction for obtaining the best shape of tooth.

THE practice of milling has, during the present century and the last decade of the nineteenth century, encroached decidedly on the field occupied by the shaper and planer. The action of milling possesses advantages over shaping; it also has its drawbacks. Much work must be done before we can state the relative merits or potentialities.

In the art of milling, the only published investigations have been handled by machine-tool builders. Attention has in consequence been focused more on the machine than on the cutter. Further, in the investigations already made, the objects sought have usually had the defect of being too immediate. This paper describes an attempt to investigate the fundamental principles underlying the action of milling.

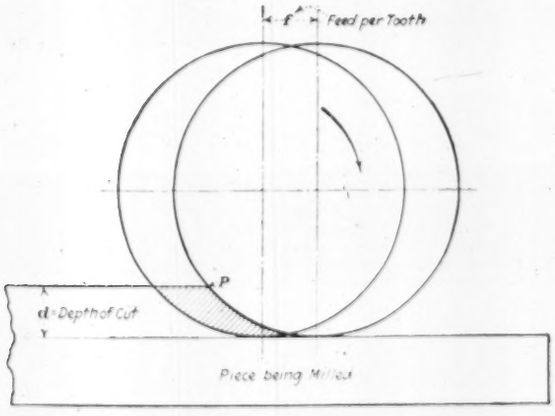


FIG. 1 SHAPE OF MILLING CHIP

It is shown in the present investigation that metal is removed more efficiently with thick chips than with thin chips. It follows from this that, other conditions being equal, including speed and feed per minute, the cutter with the fewest teeth gives the greatest efficiency. However, it is evident that the efficiencies of two cutters with different numbers of teeth are equal provided the table feeds be adjusted so that the same feed per tooth is effected. This gives a definite working theory on the influence of spacing.

In addition to the present investigation, experiments published in substantiation of the advantage of wide spacing agree in confirming this theory. It is definitely established that for a given material, tooth shape and sharpness, thickness of chip is the sole criterion of the efficiency with which metal is removed in milling and that increase of spacing over that required for free cutting is a handicap. Present-day high-powered cutters have several times the chip space needed. Limitation of machine power has doubtlessly been the chief factor in giving a false bias to the influence of spacing.

The work described in this paper started in May, 1920, through a desire of the National Twist Drill and Tool Company of Detroit to find a rational basis for the action of a milling cutter, so far as this could be removed from the region of empiricism. This company furnished the financial support throughout. The experiments have been conducted in the Engineering Shops of the University of Michigan, and at the works of the National Twist Drill and Tool Company, the Lincoln Motor Company and the Hudson Motor Car Company. The greater part of the work was done at the University of Michigan, but the tests on machineability were run at the works of the National Twist Drill and Tool Company and those on endurance at the two automobile plants.

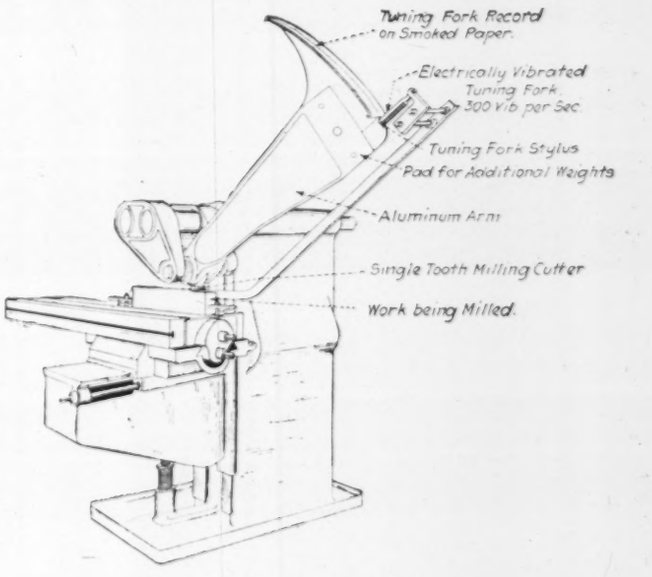


FIG. 2 CHIP INVESTIGATOR

A DYNAMICAL STUDY OF SINGLE-TOOTH ACTION

The chip taken by a plain slab mill is very different from the chip taken by a lathe or shaper tool. A milling chip is shown exaggerated in the shaded portion of Fig. 1. The two circles show the outline of the cutter at the beginning and at the end of the interval taken for the cutter to revolve through the angle subtended by one tooth. The shaded portion will therefore represent the material removed by one tooth and will have an area $f \times d$.

The chip starts infinitely thin and its thickness gradually increases to a maximum just before the finish, from which point it quickly decreases. This decrease is practically instantaneous in an unexaggerated chip. The question arises, how does the force vary throughout the cutting of this chip?

The first problem is to find how the tangential force varies in relation to chip thickness. For measuring this force while the chip is being formed under reasonable commercial velocity conditions, a dynamical measuring method is the only solution, as a chip is completely cut in about one-tenth of a second.

Description of Chip Investigator. Fig. 2 is a diagrammatic representation of the apparatus here known as the Chip Investigator. A block of material is shown bolted to a milling-machine table

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and a single-tooth cutter in place, the latter being rigidly attached to the sector-shaped arm. This arm can partially rotate about an axis at its lower end, and in so doing it carries the cutter through an arc long enough to make a chip of the desired length.

If the arm be allowed to fall freely, the angular velocity will increase throughout the fall. If this be repeated after the table is adjusted so as to cause a cut to be taken, then the next fall of the arm will be retarded, because it must give up sufficient energy

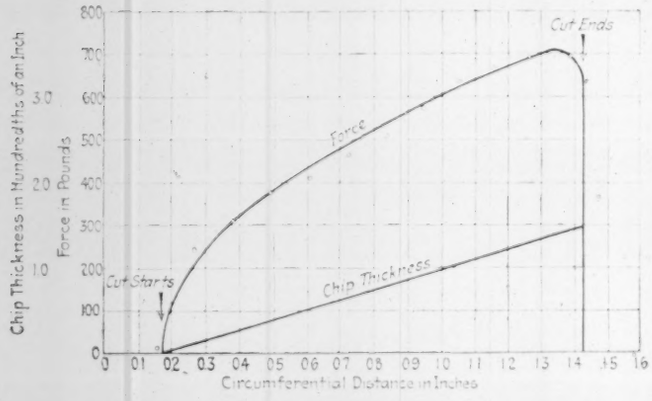

Fig. 3 Force-Space Curve of Chip Formation

to do the cutting. Weights can be placed on the Pad for Additional Weights (see Fig. 2) sufficient to secure a roughly uniform speed during cutting.

The investigation of the velocity at each instant is made by means of a tuning fork, which gives a record on smoked paper. The outer surface of the arm, remote from the axis of oscillation, is concentric; to this a glazed paper ribbon is attached and then smoked by a gas flame.

An angle iron bolted to the front face of the machine carries at its upper end a Koenig electrically driven tuning fork making 500 vibrations per second. As the arm falls, a wavy line is traced on the smoked paper by a stylus attached to one leg of the tuning fork. Each wave represents a definite interval of time, viz., two one-thousandths of a second. The smoked-paper record is immediately dipped in thin shellac varnish and hung up to dry.

An example of a chip study is given in Fig. 3, where it is very clearly shown that the force employed is not proportional to the chip thickness. In other words, material is removed more efficiently as the chip becomes thicker. This is confirmed later by experiments on varying feeds and furnishes the true explanation of the supposed advantages of coarse-tooth cutters.

Over twelve hundred chips were cut and the energy computed. These were taken at three different cutting speeds, viz., 17.5, 32 and 44 ft. per min., respectively. The average of the energy required at different speeds was remarkably equal. If the energy used at lowest speed be taken at 100, the results are:

Speed in ft. per min.....	17.5	32	44
Energy.....	100	101.8	97.4

As there appears to be no law in this and the variation is slight, presumably due to experimental error, the conclusion was reached that speed does not influence energy required.

Influence of Rake and Feed on Cast Iron. The results of the analysis of sixteen sets of chip formations in cast iron are given in Figs. 4 and 5. Each set consists of three chips formed at the different speeds as stated in a previous paragraph.

The area under each curve gives a numerical representation of the average production of each tool over a certain region of chip weight. Taking the 0-deg. rake tool as 100, we have:

Production of 0-deg. rake tool = 100
Production of 10-deg. rake tool = 133
Production of 20-deg. rake tool = 138.4
Production of 30-deg. rake tool = 142.1

Influence of Rake and Feed on Bronze, Machine Steel and Carbon Tool Steel. The results of the analysis of sixteen sets of chip formations each in bronze, machine steel and carbon tool steel are given in the following table. As in the case of cast iron, the consistent superior economy of heavy feed is observed. This information is condensed as before and results in:

	Bronze	Machine Steel	Carbon Tool Steel
Production of 0-deg. rake tool =	100	100	100
Production of 10-deg. rake tool =	113.2	118.7	106
Production of 20-deg. rake tool =	123	157.2	112.2
Production of 30-deg. rake tool =	118	172	112

Effect of Lubrication. Various experiments were run with lubricants. The results must be taken qualitatively rather than quantitatively. This topic offers an important field of investigation for future experiments.

In milling there is a decided influence entirely apart from heat-conducting properties. If the surface exposed by the last chip was very slightly smeared with an oiled finger (the oil film was

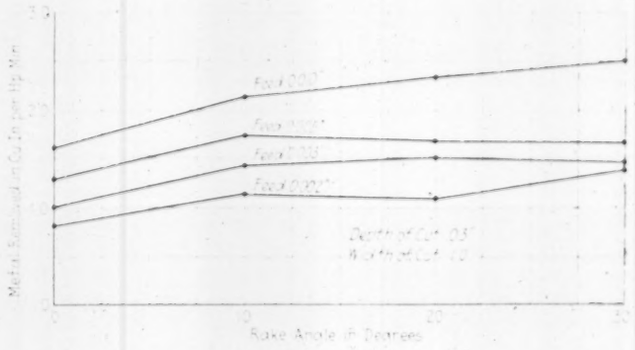

Fig. 4 Milling Tests on Cast Iron: Metal Removed as a Function of the Rake

scarcely discernible), the energy consumed in taking the next chip was from 10 to 25 per cent lower in nearly all cases.

On plotting batches of results, however, the surprising situation was found of oil proving advantageous with low rakes in bronze and detrimental with high rakes. The existence of some unknown varying factor was suspected and the results would have been

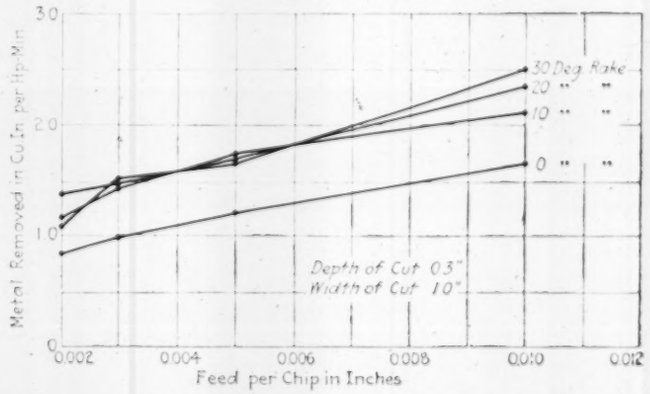

Fig. 5 Milling Tests on Cast Iron: Metal Removed as a Function of the Feed

rejected and forgotten but for the fact that the same effect showed up in experiments with machine steel made at a different time. The metal removed per horsepower-minute is shown plotted against rake for the two materials in Fig 6.

The authors hesitate to accept the foregoing unreservedly until further investigation sheds some light on its rationality. A study of the resultant force during the formation of a chip with reference to its changing magnitude and direction would give the needed explanation. This has not yet been undertaken.

Effect of Chatter. When chatter occurs, a violent fluctuation of energy results. The energy consumed was usually greater than with smooth cutting. The authors believe that, due to chatter alone, increase of energy invariably results and that where a decrease appeared it was caused by the cut being lighter than supposed to be. This can be brought about by the chatter causing

an increase of force normal to the work and this in turn springing the work or cutter. A detailed study of chatter was not made, but probably will be at a later date.

Effect of Clearance. Clearance was found not to affect energy consumed. Chatter, wear of tool and liability of tool to snip are affected by clearance.

Effect of Spiral. Experiments were carried out on the effect of spirals. The results were not sufficiently uniform to justify a conclusion on the influence of spiral angle on energy, beyond the fact that cutters with spiral angles of over 25 deg. certainly require more energy.

Method of Determining Machineability. The word "machineability" is suggested to indicate the ease with which a given material can be machined. This, of course, presupposes standardized conditions of tool and size and shape of chip. If all conditions be

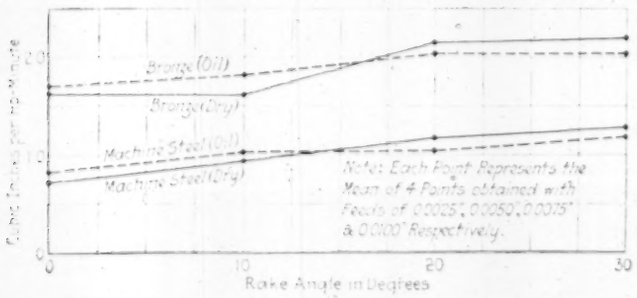

FIG. 6 EFFECT OF OIL ON MILLING MACHINE STEEL AND BRONZE

standardized except the quality of the material being cut, then the machineability can be expressed in foot-pounds of energy required to remove one cubic inch of the material under investigation.

It is well known that machineability is a continual bone of contention in machining departments and that no accepted satisfactory way has yet been devised for its measurement. It is generally admitted that even though chemical analysis, tensile strength, elongation, Brinell hardness number and scleroscope hardness number are known, yet the machineability is an unknown factor. In fact, the War Department gave to the American

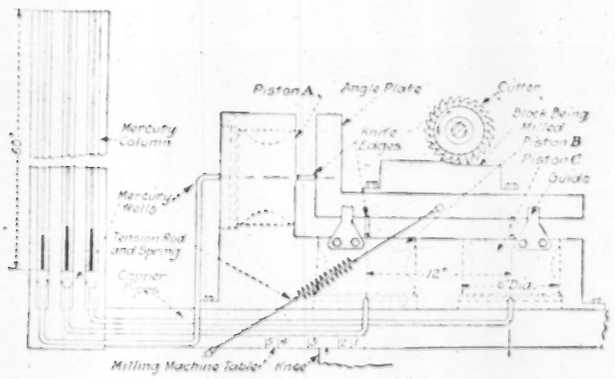

FIG. 7 THRUST AND TORQUE MEASURER

Research Council as their major topic the development of some definite means of determining machineability.

A machine has been developed along these lines and is described later in the paper. For identification purposes it is referred to as the "Machineability Tester." Experiments with this machine are presented at the end of the paper rather than here, because they were the last experiments to be performed.

To summarize: The authors had, at this stage of development, no definite idea leading to a rational structure which would connect up the results. They regard the work already described as useful in opening up territory, thereby enabling them to formulate more definite layouts for subsequent work and believe that broadly the following conclusions are justified:

1 As a chip thickens, metal is removed more easily per unit volume

2 As rake angle is increased, metal is removed more easily per unit volume. Also this improvement is continuous but not uniform

3 The advantage of rake depends on the material and is more pronounced with ductile materials

4 The effect of lubrication proper (apart from cooling action) is decided, but the information available is inadequate to formulate it.

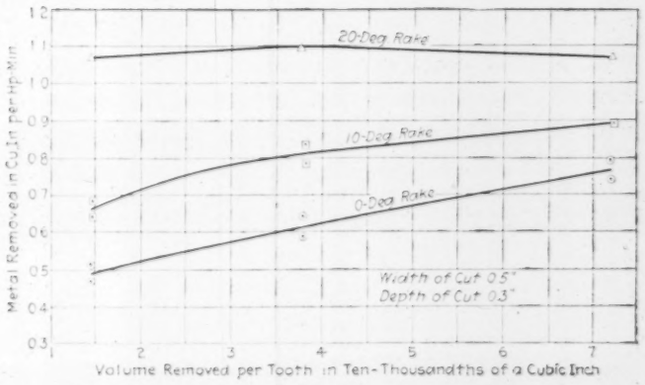

FIG. 8 INFLUENCE OF RAKE IN CUTTING MACHINE STEEL

FORCE ANALYSIS OF CUTTER IN ACTION

It was thought desirable to measure both the vertical and horizontal components of the force exerted by the cutter. This necessitated developing an instrument that would measure both force and location, i.e., in all, three quantities: magnitude, direction and location. Or, which amounts to the same thing, the two components and the location may be measured.

Description of Equipment Employed. The apparatus developed for force and power analysis is shown diagrammatically in Fig. 7, and is designated the "Thrust and Torque Measurer."

The angle plate to which is bolted the material being cut is carried on three knife edges, through which the forces are transmitted to pistons *A*, *B* and *C*. The double-knife-edge principle used transmits only a horizontal force to piston *A* and only vertical forces to pistons *B* and *C*.

The fluid pressure under the pistons is transmitted through pipes and measured by means of mercury columns shown at the left of Fig. 7. As the table travels in feeding, the location of the downward thrust of the cutter in relation to cylinders *B* and *C* changes continuously. The table traveling from left to right results in the pressure decreasing on *C* and increasing on *B*. The readings of mercury columns must therefore be taken for known definite locations of table. Five marks were made in the table, and as these successively came into alignment with a zero mark on the saddle, the readings were taken.

Influence of Rake on Machine Steel. The results of fourteen experiments are shown graphically in Fig. 8. The noticeable consistency in the spacing of the pairs of values given as results of the zero rake cutter is due to the second three having been taken in a different part of the block from the first three. The results show the decided advantage of rake. The advantage of heavy chips is also clearly shown except in the case of the 20-deg. tool.

The authors do not draw any conclusion regarding this exceptional case as the experiments available are too few. In general, there is conclusive evidence that heavy chips are more economical of power than small chips, within the practical limits of present-day milling practice. The exact extent of this economy cannot be stated at the present state of the art. It is certain, however, that this condition is a function both of the material and of the rake. The influence of rake appears to depend largely on ductility.

The area under each curve gives a numerical representation of the average production of each tool over a certain region of chip weight. Taking the 0-deg. rake tool as 100, we have:

Production of 0-deg. rake tool = 100
Production of 10-deg. rake tool = 130
Production of 20-deg. rake tool = 176

***Influence** of Rake on S.A.E. 3240 Alloy Steel.* The results of

twelve experiments are shown in Fig. 9. Again taking the area under the curve to represent the productivity, we obtain:

Production of 0-deg. rake tool = 100
Production of 10-deg. rake tool = 130.5
Production of 20-deg. rake tool = 137.5

In this case the advantage of rake is not so decided as with the more ductile machine steel, particularly above 10 deg. In addition, the same tendency is observed to reduce the advantage of thicker chips with a high rake.

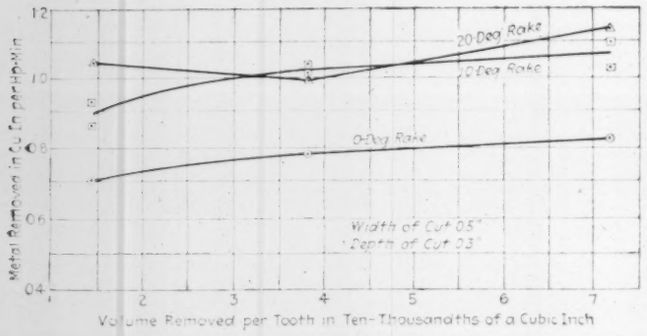

FIG. 9 INFLUENCE OF RAKE IN CUTTING ALLOY STEEL

Influence of Depth of Cut. Thirty-five experiments were run with various depths of cut, various feeds, and two different rakes. Analysis of these results gave rise to a belief that the block of material used was far from homogeneous. These experiments are not recorded in detail for this reason. It is advisable, however, to record certain impressions obtained and tentative conclusions.

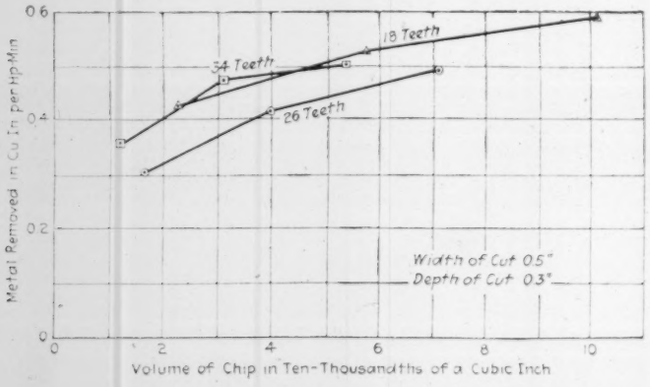

FIG. 10 EFFECT OF VARYING SPACING: ALLOY STEEL

If the material removed per hp-min. be plotted on a chip-volume base, then a shallow cut gives a curve higher than a deeper cut. This is not surprising. It has been shown that, as a chip thickens, the material is removed with less energy per unit volume. If two chips of equal volume but of different depths of cut be taken, then the chip of the shallow cut is shorter and thicker.

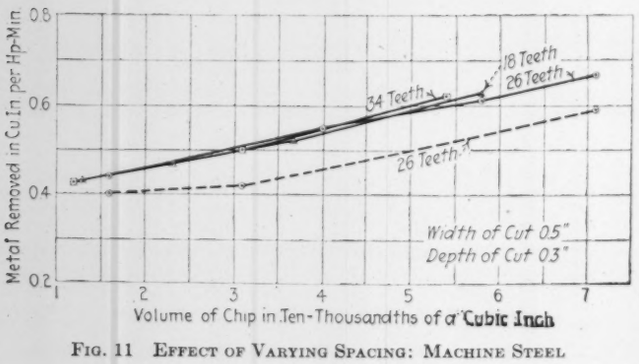

FIG. 11 EFFECT OF VARYING SPACING: MACHINE STEEL

It appeared probable that, with a given cutter and uniform material, if the feed per tooth and depth of cut were varied, the number of cubic inches per hp-min. would prove to be a definite function of maximum chip thickness. Experimental verification of this is given later in the paper.

TABLE 1 EFFECT OF LUBRICATION

Milling Cutter: Clearance angle, 5 deg.; rake angle, 10 deg.; spiral angle, 0 deg.; diameter, 6 in.; number of teeth, 34; depth of cut 0.3 in.; width of cut, 0.5 in. Material: Alloy steel No. 10

Exp. No.	Feed in. per min.	Speed r.p.m.	Vol. per Tooth cu. in.	Torque, in-lb.	Cu. in. per hp-min.
1026 Oil	0.92	27.9	0.000145	306	1.018
1026 Dry	0.92	27.9	0.000145	364	0.855
1027 Oil	2.36	27.9	0.000375	760	1.070
1027 Dry	2.36	27.9	0.000375	875	0.930
1028 Oil	3.10	19.3	0.000710	1335	1.148
1028 Dry	3.10	19.3	0.000710	1430	1.071

Influence of Lubricant. The results of six experiments, which merely touched the fringe of the effect of lubrication, are given in Table 1. It is dangerous to generalize too broadly from a few results, but one can at least conclude that lubrication effects a reduction of energy and that this reduction appears more pronounced in light cuts. It should be again noticed that this is almost pure lubricating action and that the conduction of heat by the oil plays only an insignificant part.

Effect of Spiral. A 34-tooth non-spiral cutter 6 in. in diameter and having a 10-deg. rake was run in comparison with cutters similar in all respects excepting that they possessed a $12^1/_2$-deg. spiral angle. Two cutters with left- and right-hand spirals, respectively, were used in combination, thus eliminating end thrust. Two different combinations of speeds and feeds were used. The material cut was machine steel. The results were as follows:

R.p.m.	Feed, in. per min.	Cu. in. per hp-min. 0-deg. spiral	Cu. in. per hp-min. $12^1/_2$ deg. spiral	Lost output of spiral cutter
28.1	0.92	0.422	0.338	20 per cent
16.1	0.92	0.568	0.458	19.4 per cent

The authors are well aware that a general belief exists in the superior power efficiency of spiral cutters. Frequent statements to this effect can be found in the literature of the subject. In this investigation it has been impossible to substantiate these. It is difficult to understand the growth of the belief that spiral cutters are more efficient, because abstract analysis leads to the conclusion that spiral cutters must be inferior to straight cutters. By "inferior" the meaning intended is in reference to power efficiency only. The use of a spiral angle is heartily recommended, for it results in continuity of action, tends to avoid chatter, and keeps the driving power more smoothly constant. The smallest angle consistent with smoothness of action should be used.

Theory of Tooth Spacing. Opinions differ on the influence of tooth spacing or, in other words, the relative merits of coarse-tooth compared with fine-tooth cutters. Many cutter manufacturers standardize two types, the fine-tooth cutter and the "high-powered" cutter. Experiments have been published purporting to show the advantage of coarse-tooth cutters. Possibly many others have been made and have probably convinced the experimenter that the claims made were justified.

There is an interesting delusion in this subject and it is unfortunate that it has held sway for so long, for it has resulted in inefficient types of cutters being used. Most of the so-called high-powered cutters today on the market would be improved if more teeth were given.

It has been demonstrated earlier that the force required to remove metal does not increase in proportion to the chip thickness. It follows directly from this (and has been independently demonstrated by the Thrust and Torque Measurer) that as feed is increased the force will not increase in proportion.

Another way of stating the last paragraph is that the heavier the chip the more metal removed per hp-min. If one were to make a comparison of two cutters with different numbers of teeth but run at the same speed and feed per minute, then obviously the cutter with fewer teeth would remove the metal with less power *because the chips are thicker*, there being fewer teeth cutting per minute for the same amount of metal removed. It appears illogical, a priori, to suppose that the force action of a single tooth under any given set of conditions should be influenced by the location of neighboring teeth, *if free cutting is in operation.* This view is fully substantiated by experiment.

Referring to the preceding paragraph, if the feed has been increased with the fine-toothed cutter in the ratio of a number of teeth in the two cutters (thereby making a chip of the same thickness as with the coarse tooth cutter), *then exactly the same cubic inches per hp-min. would have been removed as were removed with the coarse-tooth cutter, and more actual cubic inches of material would have been removed per minute, provided the limit of machine power had not been reached.*

If comparative tests had always been analyzed from the point of view of chip volume (or maximum chip thickness, if the depth of cut varies), then the unmerited virtue of wide spacing would never have been recognized.

Three 6-in. diameter side mills were taken, 0.5 in. thick and with 10 deg. rake. They had respectively 34, 26 and 18 teeth. Various tests were run in alloy steel and in machine steel. The results of these experiments are plotted in Figs. 10 and 11.

Experiments with the same cutter are joined by a line. In both figures the 34-tooth line and the 18-tooth line came superposed within experimental error. The 26-tooth line came roughly parallel but lower in both cases. This appeared to establish the equality of cutter efficiency in the case of the 34- and 18-tooth cutters with different tooth spacings when given equal chip volume. The distinct inferiority of the results with the 26-tooth cutter to the results of both the others suggested some defect in the cutter. It was found that the side clearance was almost nil.[1] This was remedied and the tests were repeated in machine steel with the result that the 26-tooth line coincided on the left with the two others. On the right there is a slight separation due to experimental error, but no consistency can be traced. The experiments with the 26-tooth cutter were not repeated in alloy steel, as that particular block was not available.

In a paper[2] presented at the 1911 Spring Meeting of the Society by Mr. A. L. De Leeuw, claims were made regarding the superiority of wide spacing. This publication caused coarse-tooth cutters to increase in favor. If the experiments there recorded were to be compared on a chip-volume basis, the different cutters would

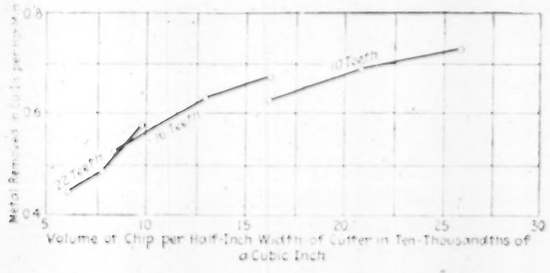

FIG. 12 CINCINNATI MILLING MACHINE COMPANY'S EXPERIMENTS

doubtlessly lose their separate identity from an efficiency standpoint. As the speed of cutting is not recorded in these tests, it is not possible to find the chip volume, and so effect this comparison.

It is equally effective, however, to analyze data extracted from A Treatise on Milling and Milling Machines, issued by the Cincinnati Milling Machine Company. On page 147 of that work results are given of tests with cutters of 22, 16 and 10 teeth, respectively. These results are there submitted as establishing conclusively the superiority of the coarse-tooth cutter. The data in question are reproduced in Fig. 12, the chip volume being calculated for 0.5 in. width of cut, to make the results comparable with the others in this paper.

These results are seen to follow the same basic law as others already given. To summarize: Material and depth of cut remaining constant, the efficiency with which the metal is removed is determined solely by the chip volume and is independent of the number of teeth in the cutter.

If in using a fine-tooth cutter the feed be increased in order to give the same weight per chip as was given in a comparative test with a coarse-tooth cutter (and so equality of efficiency), one of three things might happen:

a Chips might clog due to lack of chip room
b The limitation of power of machine might be reached
c The limit of structural strength of the cutter might be reached.

Condition (*a*) is very apparent, for the efficiency rapidly drops to zero as soon as chip room becomes too small. This is proof that the spacing is inadequate, a condition which doubtlessly frequently existed formerly. Condition (*b*) is probably the indirect cause[1] of existing opinions regarding wide spacing of teeth.

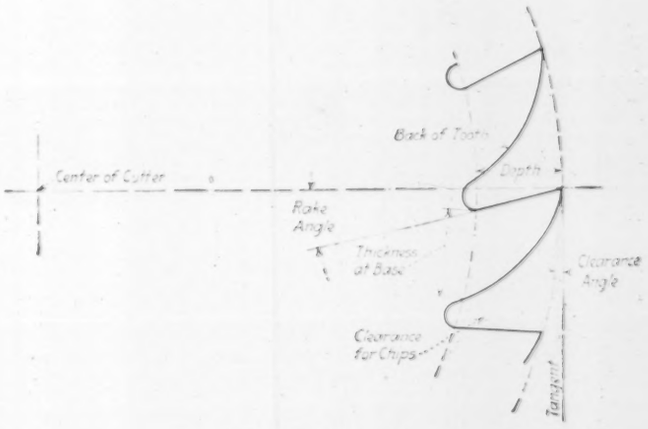

FIG. 13 DEFINITION OF TERMS

If in given tests equal chips are taken, then the cutters will remove metal, the volumes of which per minute will be in the ratio of the numbers of teeth, and will of course call for correspondingly more power. Condition (*c*) would occur in the case of exceptionally thin cutters or of unusually deep cuts.

As many teeth as possible should be put into a cutter consistent with sufficient chip clearance. It is evident, of course, that sufficient excess chip space must be provided in a new cutter to allow for a reasonable amount of grinding. As soon as the necessary chip clearance is exceeded, possible economy is forfeited. A glance at existing high-powered cutters is sufficient to show that several times the necessary chip clearance is nearly always furnished.

The cuts taken in our experiments are throughout in an everyday production region. The Thrust and Torque Measurer was not capable of carrying spectacular cuts. However, that the same law holds in the region of heavier cuts, is proved by experiments plotted in Fig. 12, as they form a similar curve. Further, a study of these curves shows that chip congestion did not play any part with even the finest-toothed cutter, for this would have resulted in the last spot falling below the general trend of the combined curve.

Considering that the whole subject of milling action centers about the action of a single tooth, it appears desirable to think in terms of this. The authors take this opportunity of suggesting to milling-machine manufacturers that this point of view be encouraged in supplying instruction data with machines. As it is, the feed is invariably given in inches per minute.[2] This is useful in checking up the time required to do a given job after the feed is known. It is of no direct value, however, in checking up whether the feed is adequate for the work, because this is determined fundamentally by a definite feed per tooth.

Further, the feed per tooth is a function of the material and of

[1] Most tests in the present section consisted in cutting grooves 0.5 in. wide and 0.3 in. deep with a side mill. It was repeatedly shown that power consumption was not affected whether the cut happened to be a groove or a land, except in this one case of side-clearance trouble.

[2] Milling Cutters and Their Efficiency, Trans. Am.Soc.M.E., vol. 33, p. 245.

[1] See later paragraph entitled General Consideration of Removing Metal by Milling.

[2] The present practice is to give feed in inches per minute with machines having a constant-speed feedshaft. Feeds are given in inches per spindle revolution with machines having the feed train driven from spindle. Recent literature indicates that doubt exists regarding the relative merits of the two systems. The problem is purely and simply that of obtaining the greatest range with the simplest mechanism. The authors believe that the constant-speed feedshaft is unqualifiedly the better of the two systems. They further believe that this lends itself to a demonstration as rigorous as a proposition in Euclidean geometry does. For discussion of this, see letter in MECHANICAL ENGINEERING, March, 1921, p. 207, by John Airey, on Milling-Machine Feed Systems.

the depth of cut. Data should be arranged so far as possible to focus attention on the maximum chip thickness. This is the basic criterion of effort from the cutter standpoint.

The authors believe that in a few years, by coöperation between milling-machine and milling-cutter manufacturers, data and practice will have evolved so that a set-up man will determine the appropriate chip thickness and then, by reference to tables, will set the speed and feed to give this. The feed per tooth for a given cutter determines the feed per revolution of spindle. If a chart were supplied giving the feed per revolution for all possible combi-

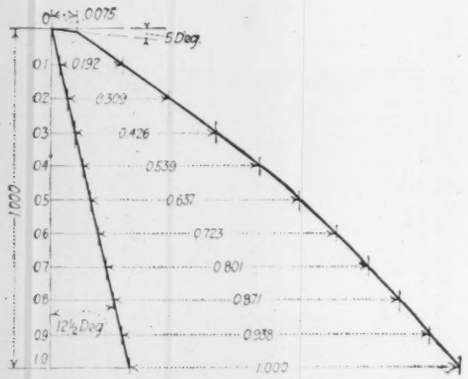

FIG. 14 IDEAL SHAPE OF TOOTH

nations of speeds and feeds, then this would be of direct use in working from a feed-per-tooth starting point and would constitute the first step in the suggested direction.

General Consideration of Removing Metal by Milling. It is an interesting and profitable line of thought to consider, in its broadest phases, the problem of removing metal by milling. The first factor to be considered is chip thickness. In order to remove the maximum amount of metal per hp-min. the chips should be as thick as possible.

The chip weight is limited by the endurance properties of the cutting tool, as is also the cutting speed, which is the second factor to be considered. Various experimenters in lathe-tool action have shown that, for a given tool, the chip weight and the cutting speed are interrelated. It should be remarked here that the degree of bluntness permissible in a milling cutter is very slight, when compared with the allowable bluntness of a continuous-cutting tool.

The greatest metal-removing capacity occurs when the product of chip volume and cutting speed is at a maximum. Let us assume that the most advantageous combination of speed and thickness is known for a given tool and material, so that these factors may be kept constant. It then follows that the closer the teeth are together, the more metal will be removed per minute, provided, of course, that the spacing of the teeth is not so far reduced that clogging of the chips takes place. Since power efficiency is determined by chip thickness only, it is evident that this is not altered by varying the tooth pitch.

If it is possible to keep the feed per tooth constant and decrease the tooth spacing without exceeding the power of the milling machine, the ideal conditions are achieved, i.e., the maximum volume of metal is removed per minute with the expenditure of the least possible power. Suppose, however, that the limit of the machine's power is reached before the minimum possible tooth spacing is obtained.

The problem now assumes a different aspect. We have already obtained the maximum power efficiency by virtue of using the thickest possible chip. If the tooth spacing is to be decreased, the power of the machine will be exceeded unless some of the other factors are changed. If the feed be reduced, the chip becomes thinner. This results in a decrease in the power efficiency coupled with a decrease in the amount of metal removed per minute.

Suppose that we leave the feed constant, decrease the tooth spacing, and at the same time reduce the spindle speed so that the feed per tooth remains the same. The power efficiency will then remain constant, as will the amount of metal removed per minute. Furthermore, the decrease in peripheral speed will result in a lengthening of the life of the cutter between grinds.

We have thus demonstrated a priori that fine spacing is superior to coarse spacing, regardless of whether the cutting speed or the power of the machine be the limiting factor. In the first case, the fine-toothed cutter will remove more metal per minute. In the second case, the fine-toothed cutter will wear longer between grindings, due to the decrease in cutting speed.

SHAPE OF TOOTH

The following six features of a tooth will be discussed:

a Clearance	*d* Depth
b Rake	*e* Thickness of base
c Shape of back	*f* Clearance for chips.

These features are defined in Fig. 13.

Clearance. Excessive clearance does not reduce the cutting force, does not appreciably affect the life of the tool in normal wear, but does tend to chattering action; also it weakens the cross-section near the cutting edge and increases liability to snip. Clearance should therefore be kept to a minimum. Three degrees was found to be ample but 5 deg. was usually used. In many tool cribs it might be desirable to standardize at 8 deg., due to the possibility of an error of a few degrees. In practice it is customary to speak of clearance in thousandths of an inch at the heel of a land. This is obviously a safer method, as the heel might bind for any given clearance angle if the land were sufficiently extended. However, for scientific analysis it is better to use degrees.

Rake. From a power-consumption standpoint rake is increasingly beneficial as it becomes greater. The advantage of rake, though, does not increase at so fast a rate after about 15 deg. is

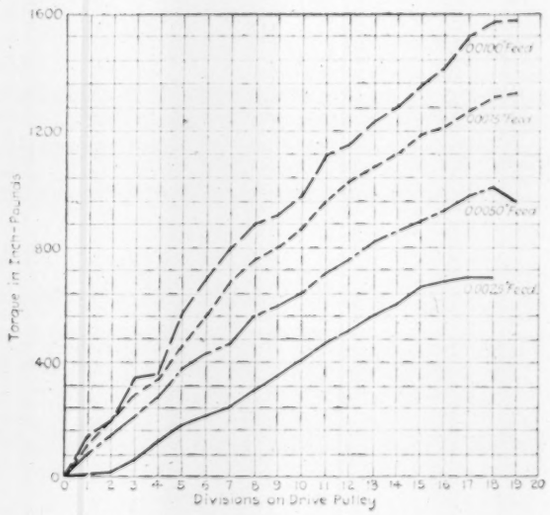

FIG. 15 STATICAL EXPERIMENTS ON FOUR DIFFERENT CHIP THICKNESSES

passed. Further, this is influenced by the kind of material being cut. On the other hand, the life of the cutter might be influenced disadvantageously by excessive rake.

It is believed that the greater the rake, the longer the life, from a simple abrasion standpoint. An increase in rake, however, necessitates a decrease in the heat conductivity of the tooth, as a consequence of which increased wear due to rising temperature is more likely to occur. A compromise can be obtained only by experiments on endurance and this is treated later.

While the decided power advantage afforded by rake is indisputable, it is not advisable to jump too far in the higher regions. Had the importance of developing cutter design in this direction been acted upon decades ago, as it should have been, then we should be on a much safer footing, as a considerable amount of data would have been available regarding action of greater rakes in all types of situations.

Under the circumstances, the authors believe and recommend that cutters be given 12½ deg. rake; further, that for any definite job it might be very desirable to go beyond this, even as high as 25 deg., but that 12½ deg. may safely be taken as a minimum, with the possible exception of rare and unusual job.

Shape of Back. The ideal tooth is that which is just as likely to break in one place as in another. Any deviation from this shape is providing useless excess strength and is detracting from chip room or deleteriously increasing tooth spacing. An ideal tooth shape is given in Fig. 14, with construction data.

Depth. The depth is controlled partly by the length of grinding life expected, but chiefly by the spacing which in turn will be shown to depend on chip clearance. It is not possible by any method of calculation to predetermine the chip space necessary for given conditions of cut. The space actually needed is a function of the shape of the chip, depending on just how tightly it rolls, manifestly a condition not lending itself to computation.

This feature can be determined only by experiment, but one fact should be kept clearly in mind in considering this, viz., that the shape of the space between teeth is equally important with its net area. The shape should be such as to prevent the chips from "packing," for this quickly causes the power to increase abnormally. Narrow, wedging bottoms must be avoided. The prevention of packing is facilitated by a spiral cutting edge; it is less liable to occur in thin cutters than in thick ones.

Thickness at Base. For a given depth, the thickness at the base is controlled by the ability of the tooth to resist fracture. This is, in turn, dependent on the quality of steel. Thickness at the base is taken as equal to depth in the recommendation here given. This is fairly consistent with present practice and gives an ample factor of safety for cuts that are customary.

Clearance for Chips. Chip clearance should be sufficient to accommodate the heaviest cut that is desired to take, and no more. It has previously been shown that if clearance is more than necessary or if the cutter is used for chips smaller than the maximum possible, then metal-removing possibilities are being

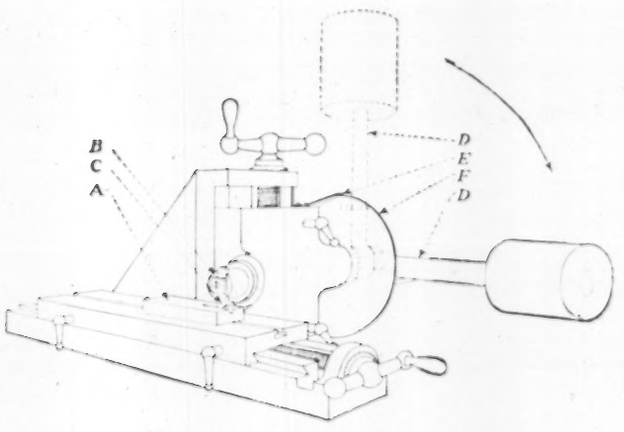

FIG. 16 MACHINEABILITY TESTER

sacrificed. Chip-clearance requirements govern the spacing, and this in turn fixes the number of teeth in a cutter for a given diameter.

Design Formulas. Formulas for determining the number of teeth for a known diameter of cutter and for determining the depth are given below, and a geometrical construction for obtaining shape of tooth has been given in Fig. 14. The arguments demonstrating the rationality of these are given in an appendix to the complete paper.

Let n = number of teeth
R = radius of cutter in inches
d = radial depth of straight face in inches

then

$$n = 19.5\, R^{1/2} - 5.8$$
$$d = 0.215\, R^{1/2}$$

A STATICAL STUDY OF SINGLE-TOOTH ACTION

Objections will doubtlessly be raised to the use of statical experiments, due to the supposed discrepancy between cutting action at a dead-slow speed or in installments, and cutting action at a customary speed. The authors believe this discrepancy to be more imaginary than real and that considerable information can be obtained by statical studies which is not obtainable by other methods.

The only object aimed at in this statical work, complete results of which are at hand, was to find if instantaneous chip thickness is the sole criterion of force at a given instant. In the early part of this work the habit was formed of thinking in terms of chip volume. It was believed that this was the basic starting point for correlation of results; and so long as depth of cut was kept constant, there was no reason to question the legitimacy of this viewpoint.

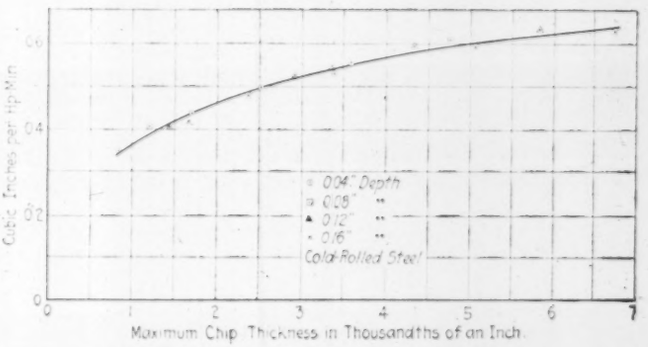

FIG. 17 METAL REMOVED AS A FUNCTION OF MAXIMUM CHIP THICKNESS

As stated in an earlier paragraph, the work done with various depths of cut was of doubtful value. Nevertheless, it was apparent that shallow cuts showed up more favorably on a chip-volume basis. This led to further speculation, ending with the conviction that not chip volume but maximum chip thickness was the feature of basic interest.

The truth of the above statement seems so obvious when the action of milling is carefully considered, that the fact would not be elaborated on, were it not that months of experimental work had been done before this idea developed. All chips, to within a small error of mathematical interest only, increase uniformly from zero thickness to a maximum. As any given instantaneous thickness of chip connotes a certain force action at that instant, and as the increase in thickness is uniform, it follows that the maximum chip thickness is a unique criterion of the material removed per horsepower-minute for a given cutter and material.

On this assumption a miscellaneous set of experiments with constant material and constant shape of cutter tooth would fall on one curve, if metal removed per hp-min. be plotted against maximum thickness. The variation in depth of cut and the varying tooth spacing would have no influence.

Comparison of Four Chips of Varying Feed. A cutter of 10-deg. rake was used, the depth of cut taken was 0.30 in. and the feed was taken successively as 0.0025 in., 0.005 in., 0.0075 in., and 0.010 in. The feed was obtained by carefully moving the table by hand and then locking the gib screw. The rotation of cutter necessary just to take one chip was divided into 20 equal parts and readings were taken.

The results are shown graphically in Fig. 15, the torque being plotted against divisions of the driving pulley. The same general shape is observed except in the case of the 0.0025-in. chip. Several attempts were made to obtain consistent results with this without much success. A little reflection on the probable distortion of results produced by the knee bracket being, say, 0.0002 in. too high or too low on a thin chip like this will account for this difficulty.

ENDURANCE TESTS UNDER COMMERCIAL CONDITIONS

Although increasing the rake angle is unquestionably beneficial from a power standpoint, the same is by no means obviously true from the standpoint of endurance. In fact it is apparent that a continuous increase of rake must ultimately jeopardize endurance.

To investigate this, numerous experiments were necessary and arrangements were made to make them under commercial conditions.

As a result of these experiments it was found that from an endurance standpoint rake is certainly increasingly beneficial up to

(*Continued on page 798*)

Heat Balance in Steam Power Plants

Particulars of Systems Employed in Three Large Modern Stations to Adjust Rate of Steam Generation to Demand With the Least Possible Waste of Heat and Expenditure of Coal

THE general topic set for discussion at the 1921 Annual Meeting of the Society is the subject of "Waste," which is of vital importance in this country, where there is such a widespread disregard of the conservation of its natural resources. The Power Division has been asked to confine its session to some feature of this general topic.

Much has been written concerning the design of power-generating equipment, combustion methods, and general design of power stations. Comparatively little, however, has been said concerning the heat balances that have been secured, and that may be secured, in steam power plants.

By heat balance we are here to understand that correlation of events in the heat cycle of the plant as a whole which adjusts the rate of steam generation to the demand with the least possible waste of heat, and at the least possible expenditure of coal. The securing of this proper adjustment is the problem now under consideration.

Labor-saving methods and devices have been introduced to such an extent that the cost of fuel is now by far the greatest item of expense in generating power. Improvements in steam turbines, increased efficiencies of boilers, pumps and other equipment have materially assisted in reducing this item. But it still remains the duty of the power-plant designer to design the plant and to select and install its equipment in such a way that the heat generated therein may be utilized to its fullest extent and every source of waste avoided in so far as possible, in order that this share in the reduction of fuel cost may be performed. Some methods, while apparently very efficient, have inherent losses, which can be determined only by very careful study.

There are four principal sources of heat waste with which the power-plant designer has to deal:

1 Radiation
2 Stack losses
3 Losses in condensing water
4 Losses due to excess exhaust steam.

The means which he employs to reduce these losses determine the heat balance to be secured in the operation of the plant.

With the thought that much good could result from a general discussion of the subject of heat balance, engineers from various companies have been asked to present the ideas used in the design of some of the recent stations.

Intimately involved in the solution of the heat balance is the method employed for driving the station auxiliaries. In the early plants they were driven principally by means of steam engines of high water rates. Improvements in steam-engine design and the introduction of high-speed turbines gradually increased the economy of the steam-driven auxiliary system; later the electric motor, both alternating- and direct-current, found favor with the designers. Today there are advocates of many systems of auxiliary drive. Some engineers prefer to use only steam drive, others alternating current, some direct current, and many favor combinations of steam and motor drive.

The systems used in the stations dealt with in the following papers are the embodiment of the ideas of their respective designers as to the best methods of properly working out the heat balance for these stations.

The Power Division desires a thorough discussion of the subject and invites the members to express their views thereon without necessarily confining themselves to the systems described in the papers. They are presented for the purpose of starting a general discussion on this very broad subject, which is of paramount importance to the designers and operators of steam power plants. While the systems described in the following papers are those used in large stations, the ideas contained in them might well be applied to stations of moderate size.

Auxiliary System and Heat Balance at the Delaware Station of The Philadelphia Electric Company

By E. L. HOPPING,[1] PHILADELPHIA, PA.

FOR the past few years the high cost of fuel and other materials used for the generation of electrical energy, together with the high cost of labor for operation, has made it imperative that the maximum economy should be obtained in the use of materials and labor entering into the construction and operation of the public-utility company's steam-electric generating stations. The greatest economies are to be found in the efficient burning of the fuel for steam generation and in the proper utilization of the energy contained in the steam. There are various factors entering into the problem in connection with the auxiliary system and heat balance for any of the large generating stations that must be considered. Any decision regarding the auxiliary system and heat balance involves the consideration of certain outstanding conditions, which may be classified in the order of their importance as follows:

a Reliability of service
b The economy in heat units per kilowatt of net output
c Simplicity and flexibility of operation with which the heat balance may be maintained under widely varying conditions of load and temperature
d The flexibility of the system in view of possible future developments and changes in power-plant equipment
e The investment and maintenance cost of the equipment used in obtaining the desired economies, and its comparative value to other systems in terms of income from the investment.

In working out the auxiliary system and heat balance for the Delaware Station of the Philadelphia Electric Company, the factor of reliability of service was considered of prime importance, and of somewhat greater value than that of heat economy. A study of the system will indicate its flexibility and its value in meeting varied conditions or varied temperatures in boiler feedwater which might be obtained with the installation of apparatus such as air extractors.

It has always been considered by this company that the small comparative cost of duplicating the main generating unit auxiliaries is fully warranted in view of the resulting ability to keep a large unit on the line in case of failure of any of the different auxiliaries connected with the unit. This particular item is one which must be considered almost entirely in the light of reliability of service, since no direct returns on the investment can be shown by the installation of duplicate auxiliary equipment.

Having the question of duplication of auxiliaries decided, the next step was to settle upon the method of driving the various auxiliaries in the plant. Due to temperature changes in the circulating water, the vacuum on the main generating units varies from about 28 in. during the summer months to 29.25 in. during the winter months. Temperature charts of this water condition show average variations of from 40 to 80 deg. fahr. With this variation in vacuum there must be considerable flexibility in the method

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[1] Mechanical Engineer, The Philadelphia Electric Company. Mem. Am.Soc.M.E.

A group of papers to be presented at the Annual Meeting, New York, December 5 to 9, 1921, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. The papers are here printed in abstract form and copies of the complete papers may be had upon application. All papers are subject to revision.

of obtaining the proper amount of heat for bringing the temperature of the feedwater to the required point, which in this case, up to the present time, has been 210 deg. fahr. Knowing the amount of heat required under varying vacuum and load conditions, it remained to select such auxiliaries to be steam-driven as would furnish the required heat through their exhaust. It was found possible to obtain this result by installing turbine drive on one of each of the duplicate auxiliary pumps connected with the main generating units, together with turbine drive on boiler-feed pumps and on one house pump. It was, however, found necessary at times of heavy load and high vacuum to supply a certain additional amount of heat, which was obtained by bleeding the main turbine at the eleventh stage.

All of the boiler-feed pumps are turbine-driven. This practice has been followed throughout the system of the Philadelphia Electric Company and has been made standard, based upon the fact that in case of a serious disturbance in the electric system of a particular plant, the boiler-feed pumps would not be affected. At such a time it is very necessary that these pumps be available for duty.

The forced- and induced-draft fans and the stokers are motor-driven and receive their current through a station light and power system. These auxiliaries and their protective equipment, described more fully later in the paper, would be shut down only in case of an interruption of the service to the two buses of this system.

On each of the main units one of the two circulating pumps is installed with a duplex (steam and motor) drive. By use of this type of drive two results are obtained:

a A flexible unit is available, which, by varying the load on the turbine drive, will supply the required heat variation for maintaining a practically constant feedwater temperature

b In case of trouble on either the steam supply or the electric service, the opposite drive will automatically pick up the load, and thus keep the condenser water in circulation. The other circulating pump, which is provided with a motor drive only, is used as a reserve, or in case it is desirable to operate two circulating pumps at a time when high circulating-water temperatures occur.

For the air and condensate pumps a duplex drive is not deemed necessary, as, in case of trouble with either of these auxiliaries, a brief shutdown would not be serious. If one of the pumps is in trouble, it only requires a very short time to put the other pump in service. During this time the vacuum, in case of an air-pump failure, should not be affected to any appreciable extent, and the condensate storage capacity in the condenser would take care of the time element in getting the other condensate pump on the line.

Throughout the plant apparatus such as coal hoists, conveyors, miscellaneous pumps, etc., is motor-operated. This equipment is all for intermittent service, and a brief shutdown of any piece of apparatus would not affect the plant system. In only two cases have we installed turbine drive on miscellaneous pumps. These are in the case of the fire pump and the house water-service pump. Turbine drives were installed on duplicate pumps in these instances in order to protect the plant should an interruption to the electrical service occur.

ELECTRICAL SYSTEM

While considering the extensive use of electric drive for auxiliaries, it was clearly realized that it would be unwise to take advantage of the economies thus made possible, unless the reliability of this supply and the sturdiness of the equipment was comparable to steam drive. In order to insure this, four considerations were kept in mind in the design of the station light and power system:

a Great care must be used in the selection and layout of the equipment, so as to give a high degree of reliability

b In case of trouble on the system any defective piece of apparatus must be isolated immediately with the minimum effect on other apparatus

c Any apparatus whose operation might have been interfered with must be restored to service as quickly as possible, with the minimum of attention by the operating force

d Any disturbance on the main generating system must have a minimum effect on the station light and power system.

The electric load was found to be of such proportions that had low voltage (600 volts or less) been employed, the investment and losses would have been very great. This consideration led to the adoption of 2300 volts for the supply of the larger motors. Though there was no definite experience available on which to base such a course in central-station practice, the economies thus effected, together with the improvements which had been made in 2300-volt equipment, resulted in the use of this potential for motors of 100 hp. and larger. Since ruggedness and reliability are essential for service on boiler and turbo-generator auxiliaries, it was recognized that great care must be exercised in selection of the 2300-volt equipment. With these thoughts in mind, features such as especially rugged contactors, both primary and secondary, for slip-ring motors, increased spacing of slip rings, 40-deg. cent. ratings, and oversize starting compensators were included in the specifications.

In the design and construction of the 2300-volt station auxiliary system the same care was exercised as in the case of the main 13,200-volt system. Bus bars and oil circuit breakers are housed in concrete compartments, and breakers of high rupturing capacity used. By the use of differential relays on all of the important motors, assurance is given that the latter will not be disconnected from the line for any reason other than failure within themselves or of the cable supplying them, thus insuring continued operation during system disturbances. The motors used with the boiler fans and circulating pumps are so arranged that, in the event of an interruption to service, they will automatically be restored to the condition of operation existing previous to the interruption.

It was recognized that boiler-room attendants, and even turbine engineers, would probably not be familiar with electrical equipment, and for this reason and for greater reliability of operation all apparatus is of the remote-control type. Hand-reset relays in locked compartments are employed, so that it will be impossible for any one but the plant electrician to restore service to a motor that has failed, and more than ordinary precautions are taken in enclosing all electrical equipment that is located in the boiler and turbine rooms.

While only two units are at present installed, the capacity of this plant has been planned for an ultimate installation of six 30,000-kw. generating units, and the electrical distribution as described below will take care of the complete installation.

The electrical supply to auxiliaries will be through four 5,000-kva. 13,200 to 2,300-volt transformer banks. Three of these are ample to carry the ultimate peak load. This energy is distributed to the various auxiliaries through twenty-eight 2300-volt feeders as follows:

9 feeders to circulating- and air-pump motors
8 feeders to boiler-fan motors' distributing bus
2 feeders to coal tower
2 feeders to motor-generator sets for d. c. supply
1 feeder for motor-driven exciter
2 feeders to miscellaneous motors' distributing bus
3 feeders to low-tension transformers
1 feeder to test set (for testing high-tension cable)

There will be three 1000-kva. transformer banks for stepping the voltage from 2300-volts three-phase down to 115–230-volts two-phase to supply small motors and lighting. There will also be two 300-kw. motor-generator sets to convert a. c. energy to 125–250-volts d. c. for driving motors of wide speed variation, such as those used for stoker drive. A storage battery serves as an emergency supply for this equipment.

MOST ECONOMICAL HEAT DISTRIBUTION

Two heat-distribution diagrams, Figs. 1 and 2, have been worked out, based on the present installation of two 30,000-kw. generating units. Fig. 1 illustrates the heat distribution for an hourly load at the most economical point of operation for the turbine, and with a vacuum of 29 in. Nearly all of the values shown are based on the results of actual tests conducted on the apparatus since its installation, and the coal rate has been based on a heating value of 13,500 B.t.u. per pound of coal as fired. At the time the heat balance for this plant was originally calculated, coal received contained an average heat value of 13,500 B.t.u., as used in this figure. This value has been used in calculations for all preliminary, or theoretical, heat balances.

The overall efficiency of the boiler, stoker and economizer of 80.4 per cent, given on Fig. 1, is based on an actual test made during the month of June, 1921, when an efficiency of 81.7 per cent at a boiler rating of 176 per cent was obtained. A correction has been made on this diagram for the lower air temperature that would prevail during the winter months, at which time a vacuum of 29 in. is obtainable.

Under "heater vent losses" has been included a loss of about 5 per cent of the exhaust steam used for feedwater heating. This loss would be difficult to measure with any accuracy, but it is believed from rough checks on heat absorbed in feedwater that the figure of 5 per cent should cover the losses at this point. The economizer and blowdown losses are correct within the limit of accuracy of the V-notch meter used to record these losses.

The item of line radiation losses, while apparently small, is noted separately, due to the fact that this is a heat loss only. When the original heat balance was figured for this plant, it was felt that it would never be necessary to bleed the turbine, due to the fact that a large increase in temperature of the condensate was expected as a result of passing the condensate through the waterbacks in the boiler bridge walls. It was found, however, in actual practice that, due to the very large combustion chamber and the more complete combustion secured therefrom, the temperature rise of the water was almost one-third less than that originally estimated.

The heat distribution for the hourly condition (Fig. 1) does not of course, make any allowances for banking or emptying of boilers for repairs. These are about the only losses which would occur over continued operation, which is not included in this diagram.

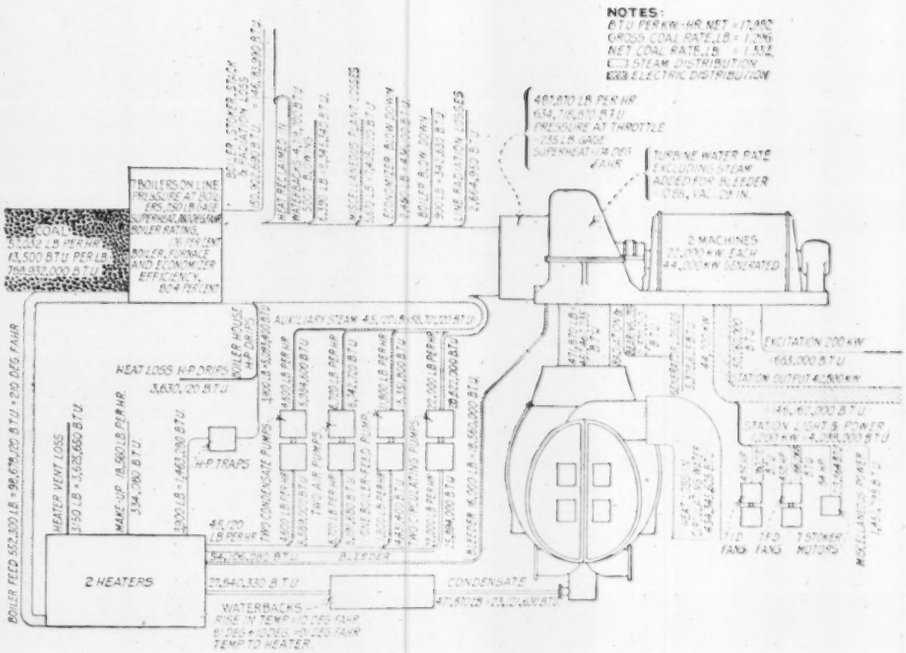

Fig. 1 Heat Balance at Most Economical Load
(60,000-kw. generating station with 44,000-kw. load and 29-in. vacuum.)

Typical Weekly Heat Distribution

Fig. 2 illustrates the actual heat distribution over a period of one week, during April, 1921. It will be noted on this diagram that the load factor of the plant, based on its maximum capacity, was only slightly over 50 per cent, which means, in this case, that the average boiler efficiency is lower, and the average turbine water rate higher, than will be obtained under more favorable load conditions. Several records of weekly coal rates which very nearly approach this result have been obtained with a lower load factor and the plant operating over considerable periods of the day with light loads on the turbine.

There are several items on this diagram which differ from the diagram in Fig. 1, as follows:

a A considerable difference will be noted between the heat value of the coal as used in this diagram and that used in Fig. 1. The coal was comparatively high in heat value during this week's operation, whereas the average over a longer period would be lower

b All of the turbine-driven condenser auxiliaries have been grouped, as the number of auxiliaries used in varying conditions necessarily varies with the load and temperature

c The station light and power load has also been given as one item, due to the fact that the number of auxiliaries in service at various times depends on the load and temperature

d There is no temperature increase shown in the condensate between the condenser and the heaters, as the water backs had not been connected to operate on condensate at that time. The heat which ordinarily would be picked up in the condensate water in this case was lost and is accounted for in the stoker and radiation losses

e The average boiler-feed temperature at this time (for the diagram in Fig. 2) was 204 deg. fahr. It was found in operation that this temperature is too low, and that not enough oxygen is liberated in the heaters to allow for operation of the boilers without considerable pitting in the integral economizer tubes

f The amount of superheat in the steam at this time was lower than shown on the diagram in Fig. 1, due largely to the fact that, with the combustion conditions obtained in the large furnaces, the superheat was below guarantees. Since that time the superheat has been increased by changes in baffling, with resulting increase in efficiency on the turbine water rate.

Throughout the week illustrated in this

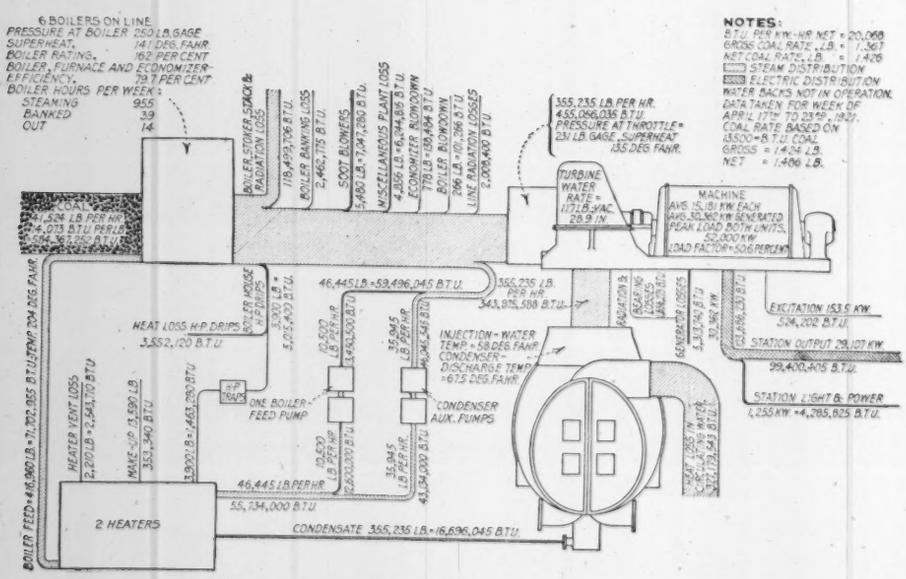

Fig. 2 Heat Balance for One Week's Operation
(60,000-kw. generating station having average load of 30,362 kw. and average vacuum of 28.9 in.)

diagram there were six boilers on the line, with the exception that over the week end, when the station load is usually low enough to be carried on one turbine, one boiler was taken out for repairs and cleaning. The banking hours represent the hours during which certain boilers were banked to take care of low-load conditions between midnight and 6.00 a.m. It was found more economical to bank boilers for this period than to operate the entire six boilers at a lower rating.

SUMMARY

Summarizing the heat-balance situation at this station, it is believed that, while there may be a slight loss in heat economy as compared with some other method of obtaining heat balance, the very important item of reliability of service as obtained by this system, and the ease with which it may be operated, will fully offset the possible gains in heat economy secured by other systems.

At the present time steps are being taken toward the installation of an air extractor, which, by removal of the oxygen from the feedwater, will not only protect the piping, economizers and boilers from corrosion due to this cause, but will increase the boiler efficiency and the overall plant efficiency by allowing us to operate with feedwater temperatures of about 140 deg. fahr.

In the operation of this auxiliary system the only points of variable control which must be taken care of by the operator are the steam supply through the duplex circulating pump and the bleeder steam. These are both, at the present time, manually operated by the regular pump-room engineers. All of the other steam-driven auxiliaries are operated to suit the larger changes in plant load and temperature conditions. These changes do not come very frequently, and are fairly regular in the time at which they occur, so that this phase of operation of the auxiliary system is of only minor importance.

The author wishes to extend his thanks to Mr. R. A. Hentz, assistant electrical engineer of the Philadelphia Electric Co., for his assistance in the preparation of the electrical features of this paper, and to the other associates in the engineering department who assisted him in assembling the data.

Heat-Balance System for Hell Gate Station

BY J. H. LAWRENCE[1] AND W. M. KEENAN,[2] NEW YORK, N. Y.

THE Hell Gate Station of The United Electric Light and Power Company, now being built in New York City, will have an ultimate capacity of 280,000 kw., consisting of eight 35,000-kw. turbo-generators. The initial generating installation will consist of two 25-cycle General Electric single-cylinder units and two 60-cycle Westinghouse double-cylinder units. The ultimate boiler installation will consist of 24 water-tube boilers, each having 18,900 sq. ft. of heating surface, with double stokers equipped with clinker grinders. At present one-half the total number of boilers are being installed.

The station will be operated as four independent groups, each consisting of one 60-cycle unit, one 25-cycle unit, one house alternator and six boilers, although provisions have been made for interconnecting the various groups electrically and mechanically.

In connection with the design of this station, the following systems for driving the auxiliaries were considered:

a All steam
b Steam and direct current
c Steam and alternating current
d Direct current
e Alterating current

After a careful study had been completed, it was decided to adopt the alternating current system.

All auxiliaries in this station are to be motor-driven, with the exception of one boiler-feed pump for each group, one fire pump and one of the two exciters for each house alternator. One-half the power for the auxiliaries of each group of two main units will be obtained from the main 60-cycle bus and one-half from the house alternator, so that in case of interruption of either source of power only one-half the auxiliaries will be shut down.

The house alternators will be 2500-kva. 60-cycle 3-phase 2300-volt direct-connected non-condensing machines, running at 3600 r.p.m. The power for the auxiliaries from the main station bus will be transformed from 13,200 to 2300 volts by means of two 7500-kw. power banks located in the boiler-house basement. All motors 25 hp. and over are to be operated at 2300 volts, excepting the motors for the coal towers, cranes and skip hoist, while motors under 25 hp. will be wound for 220 volts.

Any of the station auxiliaries excepting the motors on the coal towers, cranes and skip hoist may be operated from either the bus supplied by the main units or the house-alternator bus through the 2300-volt truck switches, which are located along the division wall between the turbine room and boiler-house basements. The house alternator and the bus supplied by the main units cannot be interconnected.

A diagram of the feedwater system of one group appears in Fig. 1. The condensate after leaving the condensers goes through closed heaters where it is heated to about 150 deg. fahr. and then enters the open heaters where it is raised to 210 deg. fahr. The condensate is then pumped by the boiler-feed pumps direct to the boilers.

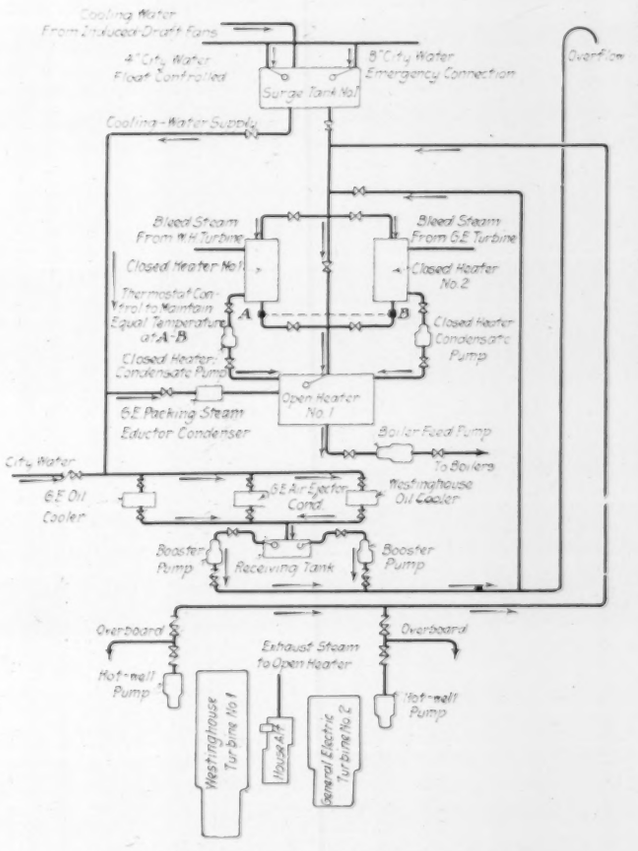

FIG. 1 HEATER CONNECTIONS FOR ONE SECTION

Thermostatically controlled valves equalize the load on the two closed heaters. The closed heaters are supplied with steam at about 6.5 lb. absolute pressure bled from the lower stages of the main turbines. The condensate from the closed heaters is pumped to the open heater. As indicated in Fig. 1, fresh water obtained from the surge tank is used for the oil coolers and air-ejector condensers

[1] Engineering Manager, Thomas E. Murray, Inc. Mem. Am.Soc.M.E.
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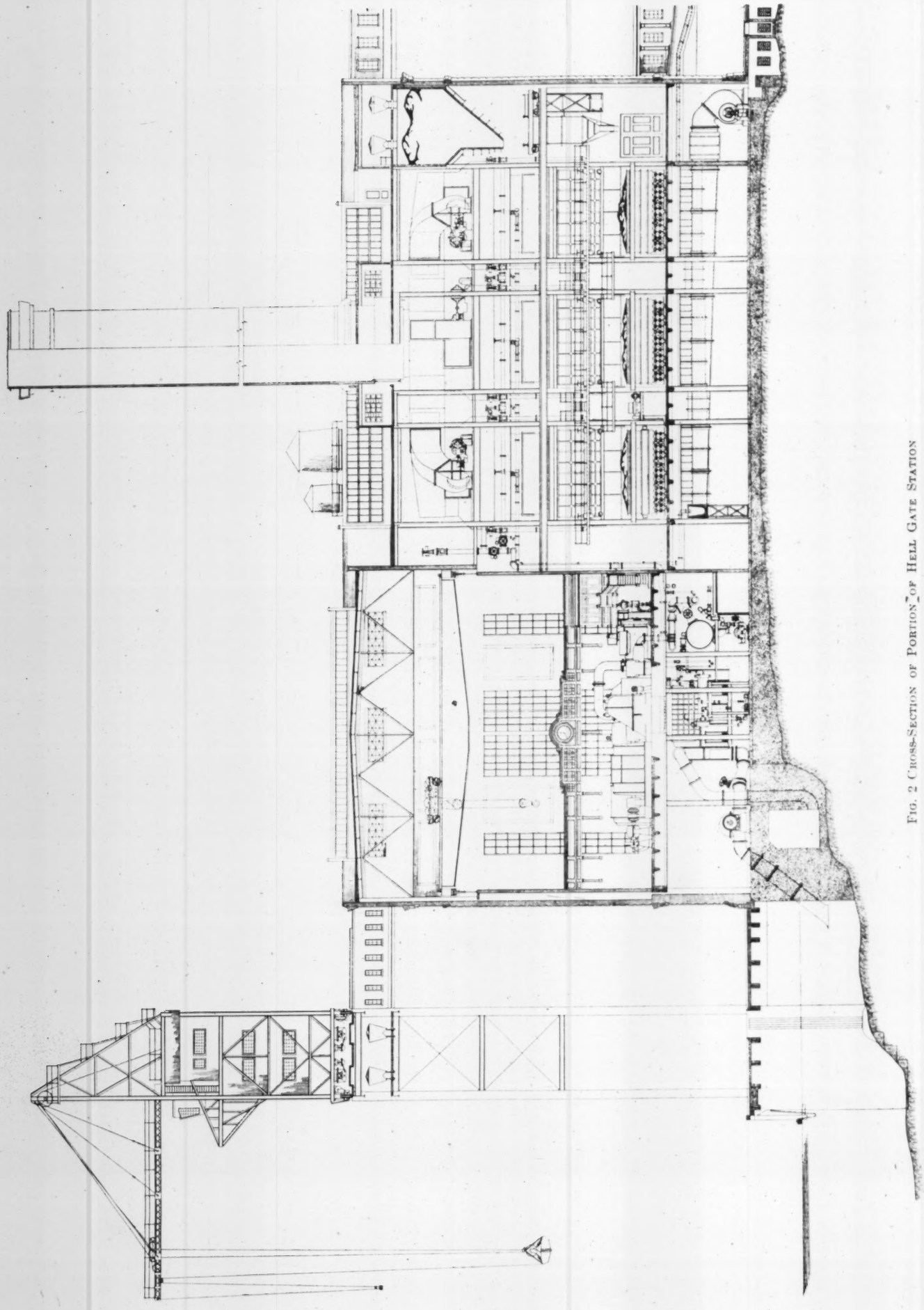

FIG. 2 CROSS-SECTION OF PORTION OF HELL GATE STATION

and discharges to the inlet of the closed heaters in order to conserve the heat from those different sources.

The house alternator exhausts at 1 lb. back pressure direct to the open heater. The exhaust from the high-pressure packing of the General Electric unit, approximately 4000 lb. of steam per hour, also flows directly into the open heater.

In order to insure a sufficient supply of steam to the open heaters at all loads on the house alternator, steam is bled from intermediate stages of the main turbines through pressure-control valves so adjusted as to automatically maintain 1 lb. back pressure in the open heaters.

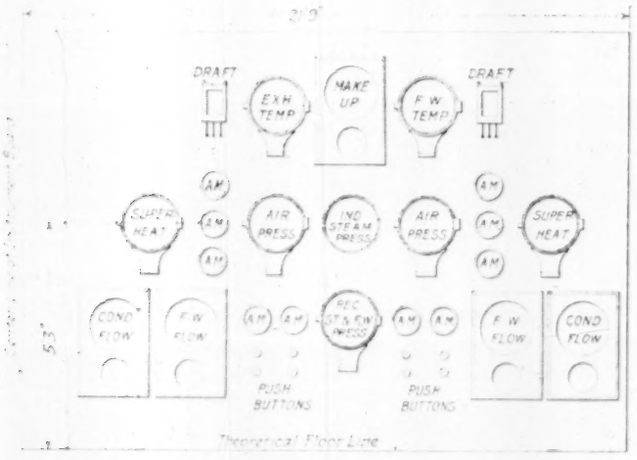

FIG. 3 PORTION OF INSTRUMENT BOARD FOR MECHANICAL APPARATUS, SHOWING LAYOUT FOR ONE OF THE FOUR GROUPS

The auxiliary control board, by which one man will supervise all the station auxiliaries, is located above the turbine-room floor. Practically the only manual regulation required for securing the proper heat balance will be the control of the forced-draft fans which will be operated by push-button switches on the control board. The induced-draft fans after being manually started are regulated by an automatic balanced-draft system.

The motors for driving the forced- and induced-draft fans will be of the brush-shifting variable-speed type. The boiler-feed pumps will be driven by variable-speed wound-rotor induction motors, while the remaining auxiliaries, such as the circulating-water, hot-well, dry-vacuum, booster and ash-handling pumps, will be driven by constant-speed squirrel-cage induction motors. The stokers will be driven by constant-speed squirrel-cage induction motors through variable-speed transmission machines. The clinker grinders will be driven by two-speed squirrel-cage induction motors.

Fig. 3 shows a typical layout of panel on the control board. The instruments for each of the four groups into which the station is divided are arranged as follows:

The draft gages in the top row are of the three-point type and indicate the furnace draft in each of the three boilers in each row of boilers.

The other instruments in the top row record: (*a*) the exhaust-steam temperature in the atmospheric exhaust line, in order to detect any loss due to excess exhaust steam; (*b*) the city water make-up to the group; and (*c*) the temperature of the feed-water to the boilers.

In the middle row are: (*a*) recorders for measuring the temperature of the steam at each of the main turbine throttles; (*b*) recorders showing the air pressure in the forced-draft duct leading to each row of boilers; (*c*) a steam-pressure gage for indicating the pressure in the main steam header; (*d*) ammeters for indicating the relative load on each of the induced-draft fans.

In the bottom row are recorders for measuring: (*a*) The condensate from each of the condensers; (*b*) the feedwater to each row of boilers; (*c*) by one instrument the main steam pressure and the feedwater pressure; (*d*) ammeters for indicating the relative load on the forced-draft fans.

It was the original intention to present herein the calculations made when computing the heat balance to be obtained, but after conferring with the various authors who were preparing papers on heat balance for the Meeting, it was felt that the chief interest would be centered upon operating figures, and as the Hell Gate Station is not in operation at the time this paper goes to press, operating figures are not available, and the heat balance calculated for it would therefore have only a theoretical value.

It was thought, however, that the presentation of the system to be employed to obtain the heat balance would be of interest at this time, and for this reason the present brief description was prepared. It is to be hoped that operating figures will be available for discussion at the Annual Meeting.

Heat Balance of Colfax Station

BY C. W. E. CLARKE,[1] NEW YORK, N. Y.

IT HAS been the practice for a good many years to drive certain auxiliary station apparatus by steam and to use the exhaust from this apparatus for heating the feedwater. Within recent years various attempts have been made to proportion the amount of steam-driven auxiliary apparatus so as to have only enough exhaust steam to maintain the feedwater at a suitable temperature. This system has taken on many different forms, but the purpose of all of them is to avoid having any excess of exhaust steam that would have to be wasted. Systems having the foregoing object in view have received the general name of "Heat Balance System." It is not within the scope of this paper to discuss the relative merits of various types of heat-balance systems. The author will simply endeavor to explain briefly, but as clearly as possible, the system adopted for the Colfax Station of the Duquesne Light System, located at Cheswick, Pa., and give some of the results so far attained with it.

The Colfax Station is designed for an ultimate gross capacity of 360,000 kw. and for a maximum output of 300,000 kw. The generating equipment as now planned will consist of six 60,000-kw. turbo-alternators, of which one is now in service and a second in process of installation. The immediate boiler equipment will consist of seven B. & W. cross-drum boilers, each having 20,880 sq. ft. of heating surface; four others of the same type, each with 22,910 sq. ft. of heating surface, are to be installed in the near future. These boilers will be equipped with 17-retort extra long Westinghouse underfeed stokers. Each of the present units has four 25,000-sq. ft. Westinghouse surface condensers, two for each low-pressure element. All condenser auxiliaries are motor-driven. There are three 1500-g.p.m. turbine-driven centrifugal boiler-feed pumps. The forced-draft equipment consists of three 250,000-c.f.m. Greene fans, turbine-driven through reduction gears. All other station auxiliary apparatus is motor-driven. A 2000-kw. house turbine is provided to supply auxiliary power. This turbine comprises part of the heat-balance system as described below.

Fig. 1 shows the bus arrangement for supplying the electrical auxiliaries. There are two buses from which the auxiliaries may be supplied, one fed through a transformer bank from the main station bus, the other fed by the house turbine. These two buses are tied together through a motor-generator set, so arranged that energy can pass from the auxiliary bus to the house-turbine bus but not in the opposite direction. A direct tie is provided between these two buses for use in case of failure in the motor-generator connection. The switches in the direct tie and the motor-generator connection are interlocked so that only one can be closed at a time. Auxiliaries are so connected that they may be fed from either bus, the switches being provided with interlocks so that both cannot be closed at the same time. With the present auxiliary load the auxiliary bus fed from the main station bus is not necessary. The house turbine is ample to carry the entire load. When the second 60,000-kw. unit is installed, however, the auxiliary load will exceed

[1] Dwight P. Robinson & Co. Mem. Am.Soc.M.E.

the capacity of one house turbine, resulting in part of this load being placed directly on the auxiliary bus and being fed from the main bus. Only as much load will be thrown on the house turbine bus as is necessary for heat balance.

For starting purposes an 1100-volt bus is provided, which obviates the necessity for compensators and other starting devices. The starting and running switches are provided with sequence interlocks, which makes it impossible to close the switch on the 2300-volt bus until after the 1100-volt switch has been closed and opened.

Due to the slip in the motor-generator set, the frequency produced by the generator is about 57 cycles when the main bus frequency is 60 cycles. If the speed of the house turbine is varied so as to make its frequency slightly above or below that of the house-turbine bus, the amount of load carried by the house turbine will be correspondingly varied. The system of using a house turbine paralleled on the main bus is not new, but in existing installations of this kind considerable difficulty has been met with, due to differing characteristics of the small house turbine and the large units supplying the main bus. The motor-generator set mentioned above was introduced into the system to avoid this difficulty. This piece of apparatus acts somewhat like a flexible coupling, taking up the momentary variations in frequency on both sides. This arrangement permits of any desired variation in the quantity of exhaust steam available for heating the feedwater since the greater part of the steam for feed heating comes from the house turbine. Its control can be practically accomplished by manipulation of the house-turbine governor control on the main switchboard alone. Manipulation of the barometric injection valve is occasionally necessary. A graphic recorder in the control room indicates the boiler-feed temperature so that the switchboard operator can maintain the boiler-feed temperature at any desired point.

The general heat cycle is indicated on the diagram, Fig. 2. As will be seen from this diagram, the condensate passes from the hot well to the double-effect evaporator, where it acts as a circulating medium in the evaporator condenser, absorbing the heat of vaporization from the water evaporated. Thence it goes to a head tank located on the boiler-house roof. This tank merely acts as a small storage reservoir to take care of variations in water flow in this part of the system. Normally, the make-up to replace water losses throughout the system enters the flow at this point as well as returns from the main unit glands and other miscellaneous clean-water returns with the exception of the high- and low-pressure drips. The water from this tank flows to the barometric condenser whose steam supply originates as described below. A sufficient quantity of steam is admitted to this condenser, the quantity being controlled as described in the preceding paragraph, to raise the water temperature to that desired for boiler feed.

Fig. 3 shows the position of the head tank, the barometric condenser and the boiler-feed tank, as well as the relative position of all steam apparatus in the heat-balance system.

Boiler-feed pumps and forced-draft fans, which are steam-driven, exhaust into an auxiliary exhaust header from which the evaporator is supplied. It is seldom, if ever possible to make the quantity of low-pressure steam in this header exactly right for the evaporator demand. Consequently, there is a connection through a flow or back-pressure valve to the house-turbine exhaust pipe. This valve permits any steam in excess of that required by the evaporator to flow into the house-turbine exhaust pipe and thence to the baro-

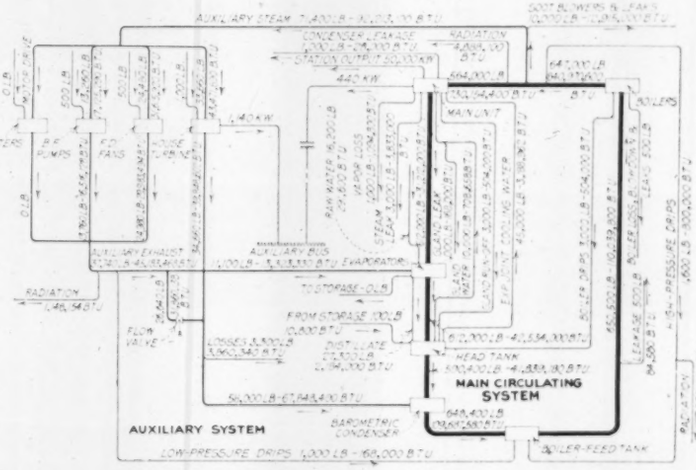

FIG. 2 HEAT-FLOW DIAGRAM
(Average vacuum in main condenser, 28.73 in.)

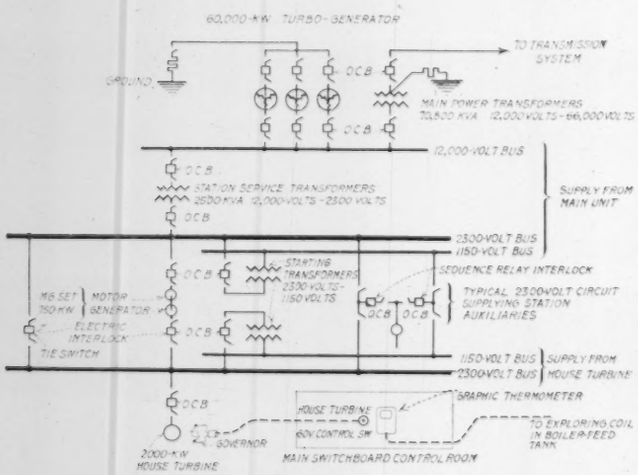

FIG. 1 CIRCUIT DIAGRAM OF AUXILIARIES

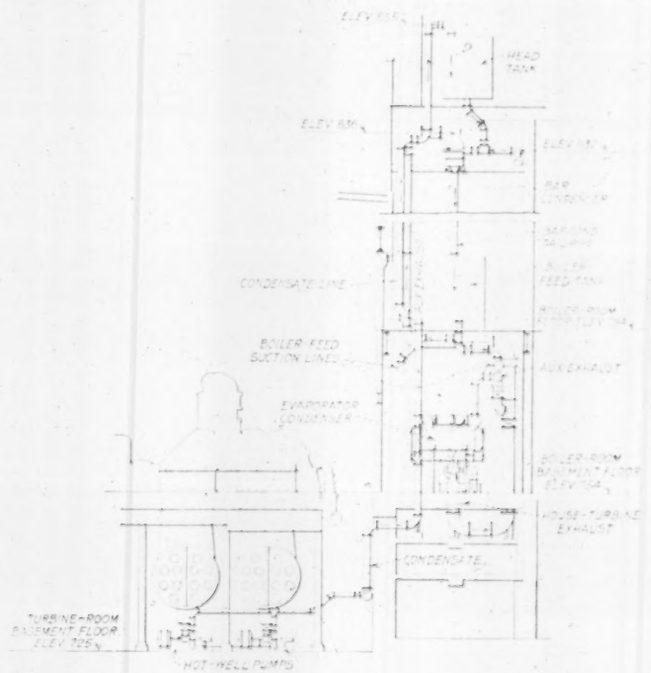

FIG. 3 GENERAL ARRANGEMENT OF FEEDWATER SYSTEM

metric condenser. It is occasionally necessary to regulate the amount of water going to the barometric condenser, and this regulation is accomplished by means of a motor-operated valve controlled from the turbine-room floor. There is in conjunction with this valve a position indicator so that the operator on the turbine room floor can tell just how far this valve is open.

The manipulation of this system is very simple and positive. For days at a time the temperature in the boiler-feed tank will not vary more than one or two degrees from 210 deg. fahr. This variation is, of course, due to fluctuations in the total station aux-

(Continued on page 825)

Salvaging Industrial Wastes

By J. A. SMITH,[1] SCHENECTADY, N. Y.

THE term "salvaging" has become a world-wide slogan. Industrial managers are studying operating conditions as never before in the history of business, and among the various phases of the subject which relate to the reduction of operating expense, the salvage of factory wastes comes in for a large measure of attention.

Let us first consider the question of salvaging metal wastes—for every factory in the country manufacturing a mechanical or semi-mechanical product produces metal scrap of one kind or another. It is essential that a system be set up whereby the various grades of metal chips and turnings will be kept separate in the shops during machine processes in order to save time and labor sorting and segregating in the scrap or salvage department. Non-ferrous metals should always be kept separate from steel and iron. When the parts machined consist of a non-ferrous metal with steel or iron, the chips should be run through magnetic separators.

In some of the bigger industries, chips and turnings are pressed into briquets of suitable cupola size, but this practice has not as yet become general throughout the country, and is carried on chiefly where the tonnage of chips and turnings is normally large. The process results not only in higher market value, but also in a material saving in transportation charges. Sheet-metal punching scrap, metal strips, trimmings, wire, etc., should always be put up in bundle form and in cupola size before being loaded for shipment, for the same reasons.

All the various classes of miscellaneous scrap metal, such as cuttings and trimmings from bar, rod, and heavy sheet stock, small castings, forgings, and solid pieces of every kind, should be accumulated in separate containers in the shop, for this class of scrap has a higher market rating than is obtained for chips and turnings.

Laboratory processes are often productive of valuable wastes either in the form of metals, such as tungsten, molybdenum, etc., or in the form of various chemical residues which may, through conversion or combination, become the basic elements of new preparations and compounds.

There is a wide variety of miscellaneous wastes which require our attention, and in this field a great amount of salvage work can be profitably done. Lumber, boxes, rope, rubber, fiber, cotton and woolen fabrics, cotton waste, paper, insulation materials, chemicals, etc., constitute some of the items which can be salvaged with profit in the modern industry. As an example, incoming boxes can be repaired and put in shape for future use either for storing materials, or as tote boxes in the shop. When too large to be suitable for these purposes, the lumber can be utilized for repairing and making tote boxes, temporary platforms, stagings, concrete forms, etc. The salvaging of lumber and making of boxes from this second-hand material in some of our large industries represents a saving of many thousands of dollars yearly in the purchase cost of new lumber. Even sawdust, usually considered of little value, can be used for the packing of porcelain and similar products, and the finer grades for the drying of metal parts in the dip shop. There is scarcely an item that we can name in the list of industrial wastes that has not some value either in its present state, or in the production of raw materials for the manufacturer's use. Even what is known as shop refuse may be burned in a destructor plant under boilers, and produce steam for heating and manufacturing.

A careful system of segregation is essential in the salvaging of metals, as well as of all other kinds of factory wastes, and this should be carried to the highest standard consistent with local conditions and without defeating the purpose of securing the highest market prices by undue expenditure for labor and equipment. It is well to have all scrap weighed and credited to departments for the twofold purpose of correct accounting and inculcating an interest for salvage work in all department heads.

[1] General Superintendent, General Electric Company. Mem. Am.Soc.M.E.

For presentation at the Annual Meeting, New York, December 5 to 9, 1921, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Copies of the paper may be obtained gratis upon application. All papers are subject to revision.

SALVAGE WORK IN MAINTENANCE AND REPAIRS

But we must carry our salvage work into other branches of shop activity, such as maintenance of property, repairs to machinery and tools, handling of stocks, and upkeep of all the various classes of small tools, including lathe and planer tools, high-speed steels, etc.; and here is where the expenditures in big industries begin to mount up to vast sums, to hundreds of thousands and even to millions of dollars, during the course of a year. It is essential, therefore, that systems be set up whereby all these items of maintenance will receive the most careful scrutiny and the expenditures will be adequately limited and controlled. Systems must be set up governing the distribution and repairs of the various classes of small tools so that the consumption of these will be regulated within certain defined limits of economy and efficient service, in accordance with production requirements in the shop. It is good practice to make regular monthly inspections of machine tools and equipment, and make a record of the same, in order that repairs may be made promptly at a minimum of cost before the damage becomes more serious or breakdown ensues with increased repair expense and added delay to production. The record is valuable as showing the relative cost of maintenance and relative life of service of various makes of tools. It is often good economy to replace a tool showing high maintenance cost with a new tool of some other make, and thus save both expense and delays to production. In all cases of replacements and repairs, valuable parts should be salvaged and made use of on other jobs of repair work, wherever practicable.

In the supply of small tools to the shop much can be accomplished in the way of reducing expense by efficient methods of distribution and collection. A system of regular inspection of toolrooms, tool cupboards, benches, and areas around machine tools should be established in all departments. Tools not needed for immediate or current use should be cleared up promptly and returned to stock, and those needing repair put into shape for further requirements. This is particularly important in the case of high-speed-steel tools where the cost is relatively high by comparison, and a single idle tool may represent a good many dollars of tied-up capital. Nearly all the various small shop tools, such as wrenches, vises, hammers, drills, cutters, pliers, files, and numerous others can be repaired to good advantage and thus be made to give greatly lengthened service and reduce the number of purchases of new tools. By a properly organized system of distribution and collection the inventory of tool stocks carried may be greatly reduced, expenditures for new tools curtailed, and those in use in the shops kept more constantly in active service.

The subject of lubrication both of machine tools and of cutting tools affords opportunity for valuable reduction in the operating expense of the shop. With modern storage equipment and modern facilities for distribution to the shops, also proper feed pipes and oilers for regulating the supply to tools, a material saving in consumption of oils and cutting compounds can be made. Selection of oils is most important, and this should always be made with a view of reducing friction load on bearing surfaces and of keeping tools properly cooled and lubricated during the process of cutting, and not primarily in reference to cost. Valuable work has been done in recent years in the substitution of mineral oils and mineral lard oils for pure lard oil in a variety of processes where formerly pure lard oil was felt to be necessary. In fact, a heavy-body mineral oil of correct specifications will do the greater percentage of jobs commonly done with lard oil without any material increase in consumption, and with greatly reduced cost. A high-grade light-body mineral oil will also do many processes, such as turret-lathe work, milling high-carbon steels, etc. Soluble cutting compounds also have their place in machine-shop practice, and their use in a great variety of processes, such as drilling and milling, plain lathe work, cold cutting, etc., results in a greater economy than can be secured with oil. Attention needs to be given to the handling and distribution of oils in order to avoid waste. Machine tools should be equipped with proper tanks, drip pans, and aprons,

in order that nothing may be lost. Reclaiming oil from production parts and from chips and turnings is a part of the salvage work of every up-to-date factory and one that need not be enlarged upon here.

We hear much talk these days on the subject of reducing inventory, and it is essential that the work be carried forward intelligently and earnestly in order to put industry on its feet. The present is the time to make thorough investigation of every department and storage space, and to gather up all surplus or idle materials and made effort to put them into service, or otherwise dispose of them to advantage. Analysis must be made of the methods of handling and distributing materials in order to establish improved systems, reduce labor, and avoid delay or damage. Special attention should be given to cutting raw materials to required dimension or multiples of required dimension in order to save waste; and to the salvaging of all left-over pieces and parts for further use in some portion of the factory, wherever practicable. For this purpose the central storehouse should act as a clearing house, and thus render aid in the general work of salvaging.

The human element enters into salvage work, as into all other industrial operations. If we can get department heads, and employees as well, interested in saving everything of inherent value, we will perform a valuable service in helping to reëstablish industry on a firm and stable basis. Not only industrial managers, but the public as well, are more and more becoming interested in this most vital of human problems. One of our big industries salvages annually, in normal times, more than eighty million pounds of factory wastes. The railroads also have caught the spirit of thrift and are establishing new practices which are showing greatly improved conditions as regards operating expense. The country at large in a recent year saved scrap, consisting of several items—metals, paper, rags, wool waste, cotton fabrics, etc.—aggregating more than one and a half billions of dollars.

In the years immediately before us, industry will be called upon to bear a large portion of the burden in the vast and arduous work of reconstruction. As engineers and managers we need, therefore, to be strongly imbued with the vital principles of economy and thrift, and with the importance of greatly increased effort along the lines of salvage work. The question of profit must not always be a deciding factor, but we must conduct our operations with a broader view of saving everything which may be of value to others in the production of raw materials or finished fabrics, whether we gain immediate, direct profit or not. The manufacture and supply of raw materials depends so often upon the supply of various kinds of scrap and waste that it is most essential we give consideration to the country's needs as a whole and do not limit our efforts at salvage work to our own desire for immediate profit. Indirectly we shall receive benefit through reduced cost of the raw stocks we purchase for our own manufacturing purposes because of the abundance of original materials which we have helped to create.

No appeal to the manufacturer to save the waste products of industry can be made too forcible or too strong, nor can we lay too much emphasis upon the necessity for every individual joining earnestly with us in this great work of universal benefit to the country at large. Every pound of junk saved at our homes and turned over to the junk dealer in the end reaches the great melting pot, and finally the marts of trade, in the form of raw materials to be of definite value to some one; and that one, incidentally, may be any one of us here engaged in the profitable manufacture of fabrics which serve a public need. The nations of Europe, through the very exigencies of the war, were forced to carry on the work of salvaging to its greatest limit in order to sustain the people at home and the armies in the field; and now, during the period of reconstruction, they appear to have doubled their effort and to have gone beyond this limit in the struggle to rebuild government and business and industry on a stable and enduring basis. We in America are gradually becoming more and more aroused to this big problem in our public and private life. We have been given to waste and extravagance in the past, but we are gradually awakening to the fact that it is not so important what we have or what we produce as what we are able to save and reclaim from all the various processes of production. What we need to learn as a nation and as individuals is the vital importance of practicing the simple precepts of economy and thrift and of guiding all our actions both in business and private life to that essential end. We need to learn to save everything of inherent value, and in doing this we ourselves shall derive a benefit in the general public good.

We ought to have a permanent reclamation service, fostered and maintained by our National Government as other public services are fostered and maintained. Through this office practical appeal could be made to the governors of states, through the governors of states to mayors of cities and presidents of villages, and through these latter to the heads of boards of trade and to public-spirited citizens, to coöperate in the great work of saving the nation's wastes. Through this channel also could be disseminated much useful knowledge and instruction relating to the work of reclamation, which would thus reach in a helpful way not only the populous industrial centers but the outlying districts as well, and by this means bring about a widespread, concerted action for the public good. No one may attempt to predict the full extent of the value or the aggregate return of such a movement to the Government and country at large.

Still another phase of salvage work which is distinct and apart from the field of salvaging metal scrap and other factory wastes, is the saving of time and of human effort, the harboring of mental and physical energy, and the devoting of all our effort to the highest purposes and the highest aims. Profitable manufacturing requires that we build up our organizations both in offices and in the factory with a view of concentrating directive effort, eliminating duplication of orders and instructions, establishing unity of purpose, system in method of procedure, and coöperative effort on the part of all employees, whether serving in official capacities or in the lower grades of mechanical and physical labor. It is essential that we organize departmental forces in such manner as will secure systematic control of all the functions of labor and consumption of materials, and the keeping of manufacturing expenses within the budget provided for conducting shop and office work. We must build our organizations with a view of attaining the highest standards possible, in order to reëstablish business on the high plane of influence which it must always occupy in the successful upbuilding and support of our Government and nation, and in the permanent establishment of the normal pursuits of industry and peace.

ON THE ART OF MILLING

(*Continued from page 789*)

10 deg. and probably is up to 15 deg. This statement is made definitely for steel up to 0.50 carbon, and it is believed that it will be found true for all metals.

Experiments With Machineability Tester

The Machineability Tester was designed, as stated earlier, for measuring quickly the machineability of different metals. This machine is shown in Fig. 16. If the weight be allowed to fall freely from the top position, it will rise almost to the same height. A pointer indicates the highest position to which the weight rises and this is taken as the zero reading. If, in a subsequent fall, a chip be formed then the weight will not rise as high. This change in height is a measure of the energy given up in forming the chip. The same principle is used in impact-testing machines.

One group of experiments run on this machine are recorded, as they were carried out to emphasize the analysis brought out previously that maximum chip thickness is the sole criterion of efficiency for a given tool and material. Four different depths of cut and four different feeds were taken, giving sixteen differently shaped chips in all.

The results of these sixteen experiments are given in Fig. 17, in which cubic inches per horsepower-minute are plotted against maximum chip thickness. It is seen that efficiency is a function of maximum chip thickness alone.

The importance of the above point of view cannot well be overemphasized. In arranging instructions for the operation of milling machines, in compiling feed and depth-of-cut data, or in comparing different jobs, the fact should be kept in mind that maximum chip thickness is the true criterion of cutter-tooth punishment.

Avoidable Waste in Car Operation —The Container Car

By WALTER C. SANDERS,[1] NEW YORK, N. Y.

This paper describes the "container" cars which have recently been placed in service on the New York Central Lines and others having improvements on the original type which are now under construction.

The advantages claimed for the container car are that less-than-carload lots of freight, mail and express may be shipped with a material saving of time to the shipper and the railroad company, in that the container car may be rapidly unloaded and reloaded. The car will also permit the railroad to secure the maximum mileage out of rolling stock.

Valuable commodities of all kinds can be transported from consignor to consignee inviolate from damage by fire, weather, breakage or theft, also eliminating to a great extent rehandling, trucking and checking.

THE container car was an outcome of the railroad congestion during the war and was first put into operation last year by Mr. A. H. Smith, president of the New York Central Lines, to reduce the transportation losses due to congestion which tied up industry. This congestion was caused by the railroads being unable to get rolling stock near the platforms or places where cars could be unloaded and reloaded and put back into circulation. In some cases manufacturing plants used box cars as a storage warehouse, gladly paying the demurrage charged by the railroads. It is hoped that mail, express and freight robberies, breakage, checking and rehandling, delays to shippers and many other railroad evils may also be materially reduced by the container-car system.

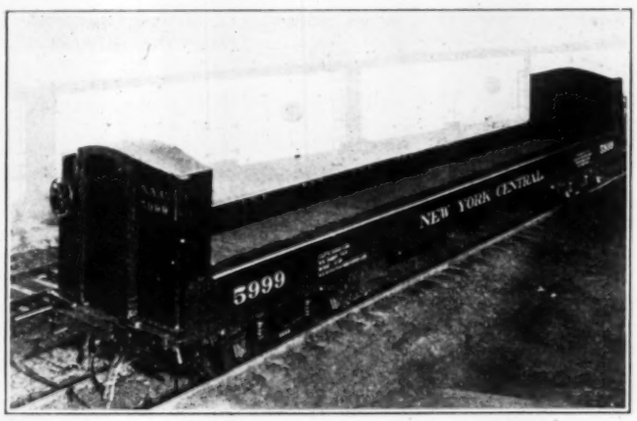

FIG. 1 THE EXPRESS-TYPE CONTAINER CAR WITH THE CONTAINERS REMOVED
At the sides are visible the guides which hold the containers firmly.

Loss of and damage to freight has grown in recent years into one of the heaviest leaks in the transportation industry and strenuous campaigns which included maintenance of extensive police and supervisory forces, together with educational campaigns among shippers and railroad employees to secure stronger packing, careful handling and suppression of theft, have failed to stop this economic waste.

The proportions of this transportation problem may be judged from the fact that in the year 1914 American railroads paid out $33,000,000 in claims for loss of and damage to freight, and for the year 1920 this mounted to a total of $125,000,000, the incidental injury to business affected being considerably greater. Under the ordinary system of handling less-than-carload lots or shipments the goods are checked and handled item by item from shipper to truck or dray, from truck to depot platform or warehouse, and from the platform to the car. They are subject to handling and checking at each stage of the journey, and when finally they reach their destination this handling and checking is all done over again. It is therefore necessary to maintain armies of employees to act as freight handlers, clerks, checkers and station overseers, as well as switchmen to shunt cars to fixed locations where loading and unloading are possible.

The container system provides that the portable container shall be loaded and locked at the shipper's own store door, conveyed by motor truck to the railroad yard, and lifted by crane aboard the container car, where steel bulkheads and sides form absolute protection against opening the container in transit. At the destination the locked container is unloaded by a crane and carried by motor truck directly to the warehouse or consignee's door, to be unloaded at his convenience. This simple system of handling goods will make it possible to greatly reduce the force of employees now necessary.

FIG. 2 THE EXPRESS-TYPE CONTAINER WITH THE CONTAINERS IN PLACE
The steel sides of the car prevent the doors of the containers from being opened.

Another advantage of the container-car system expected to prove most valuable is the greatly increased use of container rolling stock in moving service, which is particularly important when traffic expands to its "peak" and the prime need is to shorten layovers of cars in yards and stations for loading and unloading, and to limit their idleness and obstruction through misuse for storage purposes. In busy times the need is to keep every wheel

FIG. 3 POST-OFFICE TRUCKS LOADED WITH CONTAINERS AT CHICAGO POST OFFICE

[1] Equipment Engineering Department, New York Central Lines. Assoc. Mem. Am.Soc.M.E.

For presentation at the Annual Meeting, New York, December 5 to 9, 1921, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Copies of the paper may be obtained gratis upon application. All papers are subject to revision.

turning as continuously as possible to secure maximum transportation. With ample supplies of the removable containers, which in their several classes are of uniform size and interchangeable, one carload of containers may be removed and sent with their

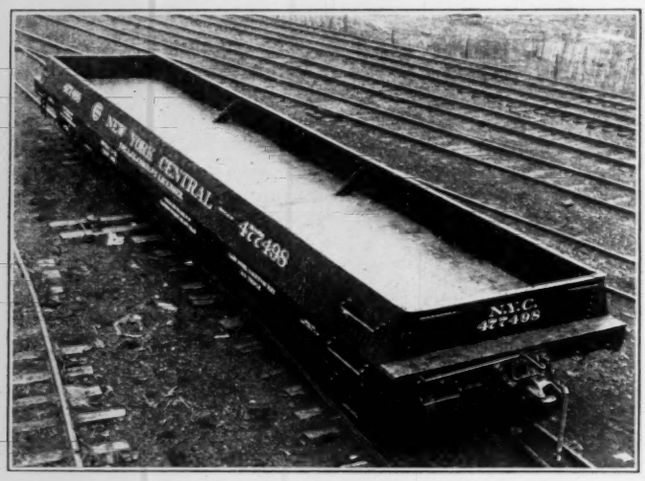

Fig. 4 The Freight-Type Container Car With the Containers Removed

Since this photograph was taken cross-plates have been added to keep doors of containers from being opened after one or more containers have been removed from the car.

loads to consignees, and another set immediately hoisted into place and the car be ready to proceed within a matter of minutes in most instances. The locked containers may remain on station platforms or at the stores of shippers for loading or unloading at convenience

Fig. 5 The Freight-Type Container Car With Containers in Place

It will be noted that the car differs materially in appearance from the express type. This photograph shows two large and two small containers. The large containers have been cut in two, making the standard equipment for this type of car 6 containers.

without tying up costly rolling stock at points where track capacity is limited and congestion quickly obstructs the flow of traffic unless the cars are kept moving. With this rapid handling of the containers on and off the car the mileage per year made by the ordinary piece of rolling stock may be doubled, and it is predicted that the tremendous expense of maintaining box cars and other rolling stock equal to all emergencies will be materially cut down.

The container car may make costly packing and crating unnecessary because goods packed in flimsy pasteboard boxes or even bound with heavy paper are protected against breakage, theft, and water or weather damage.

There are at present in service on the New York Central Lines, three container cars, one of the mail or express type, and two that are being used for valuable freight, such as silks and woolens. Three new mail cars of improved design which are now being constructed will be equipped with an improved type of all-steel container. A new freight-type container car is being designed, and refrigerator and tank container cars are contemplated.

General Description of the Container Car

The container car is nothing more than a long car with a steel side or fence, similar to a low-side gondola, loaded with large steel safes or containers, made as light as possible, in which commodities of all kinds travel from consignor to consignee, inviolate against thieves, fire, weather and breakage. The safes or containers are lifted on and off the car by cranes or hoisting devices, permitting

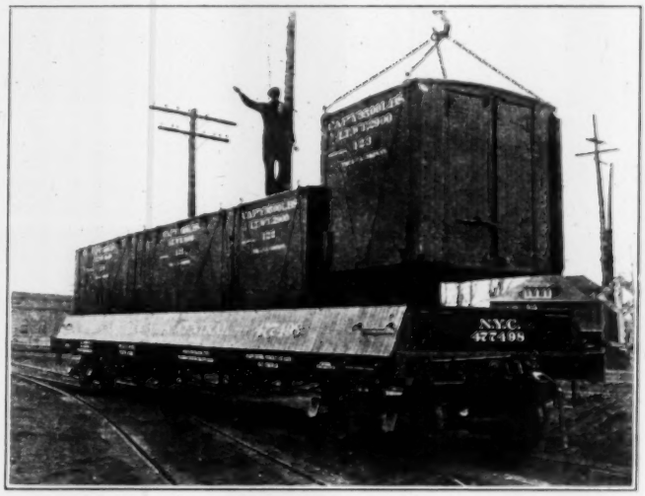

Fig. 6 Unloading a Container From the Freight Type of Container Car

the "parent" rolling stock to continue in immediate transportation circulation. In appearance the loaded car seems to be a solid load of safes or steel vaults set aboard a steel underframe with a low protecting steel fence.

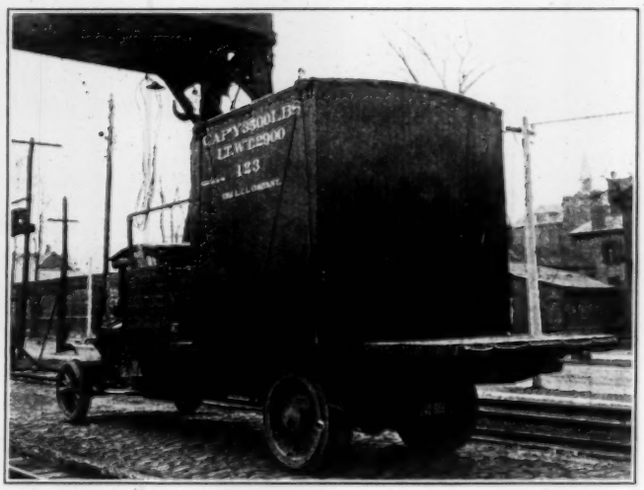

Fig. 7 A Freight-Type Container Leaving the Railroad Yards on a Motor Truck

Express Container Cars

The present express car now in use is 61 ft. 3 in. in length, with trucks and fittings that make it interchangeable with standard passenger equipment for use in any passenger train. All modern safety appliances for a special type of car are installed, such as air brakes, hand-hold irons, sill steps, etc. This car carries nine containers, each 9 ft. wide by 6 ft. long, with an inside clear height of 7 ft. 4 in. and a door 3 ft. by 6 ft. The containers are as nearly

burglar-, fire- and weather-proof as it is possible to make them, with a carrying capacity up to 7000 lb. They have wood floors and are arranged with four eyelets or hooks, one at each top outside corner, for convenient lifting and handling. The doors are of standard refrigerator design and are arranged with a hasp and staple for the shipper's padlock, also with pin and slot for standard freight-car seal.

The steel sides of the car are spaced to suit the width of the containers, with a clearance of $\frac{1}{2}$ in. on each side; the containers cannot be made as wide as the car itself because of the various state highway laws which regulate the width of motor trucks. The New York State law, for instance, limits the width of an auto truck, including body, to 8 ft., the height from road to top of truck or lading to 12 ft. 6 in., and the truck and lading must not have a combined weight of over 25,000 lb. All container cars are fitted with bulkheads and steel sides 2 ft. high into which the containers fit.

In the interior of the body of the gondola part of the car are sectional guides, made of $\frac{1}{4}$-in. steel, resembling channel steel, with the laps projecting out from the open ends to enable them to be riveted to the sides of the car. There are guides at each place on the side of the car where the corner of a container will lie.

At each corner on the length side of each container there is a shoe, also of pressed steel, which will fit into the socket formed by the two guides. This arrangement guides the containers to the floor of the car and holds them in place while the car is in transit, without additional blocking or fastening. If it is found necessary to move the car over the road after one or more containers have been removed, it is unnecessary to put in any kind of blocking, because these guides and shoes are arranged to hold the containers and prevent them from shifting or falling over due to the oscillation of the car.

Freight Container Cars

The two freight-type container cars are 50 ft. long. This is exceptionally long for a car used in freight service, being 9 ft. longer than the longest of New York Central box cars. The general construction is similar to that of the express-type container car.

The freight type carries 6 containers, length 6 ft. 7 in., width 7 ft. $1\frac{1}{2}$ in. and clear height 7 ft. $7\frac{3}{8}$ in., all inside measurements.

Each container has a steel frame, base, and roof of open-hearth steel, sides or walls of fir wood, and a radial roof so that water will shed off. All joints are double-riveted. The door in the freight type of container is located in the width side and is of standard refrigerator design. As the door is in the end or width side of the container, five 12-in. by $\frac{1}{4}$-in. steel plates are riveted to the sides of the car, extending crosswise the inside of the car, through the open clearance spaces between containers, so in case one or more containers are removed from the car, the doors of the remaining containers cannot be opened.

Containers and Container Cars Now Under Construction

The three new mail-type container cars now being built will carry 8 containers of a new, improved design, the outside measurements being, length 7 ft. $2\frac{1}{2}$ in., width 9 ft. $3\frac{1}{2}$ in., clear height 8 ft. 2 in., with a 5 ft. 9-in. by 3 ft. 6-in. door on the length side of the container. The cubic capacity will be 438 ft., light weight 3000 lb. and capacity 7000 lb.

Tests conducted in the last few months on the New York Central Lines have demonstrated that the express type of container car can be emptied of the nine containers by an ordinary crane in 21 min. and reloaded with other containers and the car put back in circulation in about the same time. This test was made with an ordinary moving track crane, since no special cranes or handling devices have as yet been constructed for use in handling the containers. With the special handling devices contemplated it will be possible to unload the containers with greater speed directly to waiting motor trucks, platforms, or on the ground.

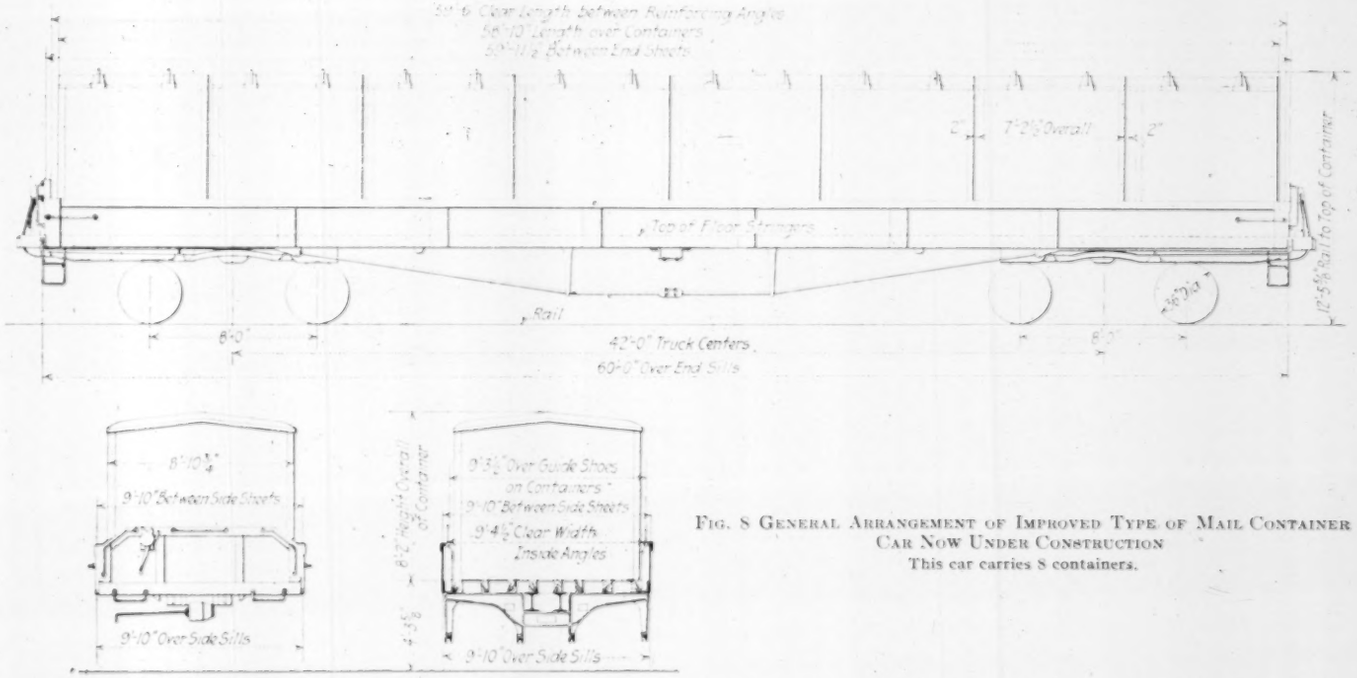

FIG. 8 GENERAL ARRANGEMENT OF IMPROVED TYPE OF MAIL CONTAINER CAR NOW UNDER CONSTRUCTION
This car carries 8 containers.

During May, 1921, at the request of the Postmaster General, a mail test was run from New York City to Chicago, Ill., and return with the express type of container car. Upon arrival at Chicago the nine containers, containing 37,000 lb. of mail, were unloaded onto waiting Post Office motor trucks in 21 min., which is one-fifth of the time used in unloading an ordinary mail storage car. At Chicago connections were made with western mail trains that have never been made before. Upon the arrival of the car at New York on the return trip the containers were removed from the car in 18 min.

It is believed that the use of containers in mail service (1) will prevent the loss in transit of valuable registered mail, parcels post and other mail; (2) will mean a saving to the Government in handling mail, both in trucking and checking, as well as a material saving to the railroads in the use of equipment; (3) will make possible a quick transfer at important gateway points and the maintaining of close railway connections otherwise impossible; and (4) will afford an increased weight and capacity as compared with the average load now handled in mail storage or baggage cars, the average weight of mail now carried in mail storage cars being approximately 30,000 lb.; 37,000 lb. of mail were carried on the run to Chicago.

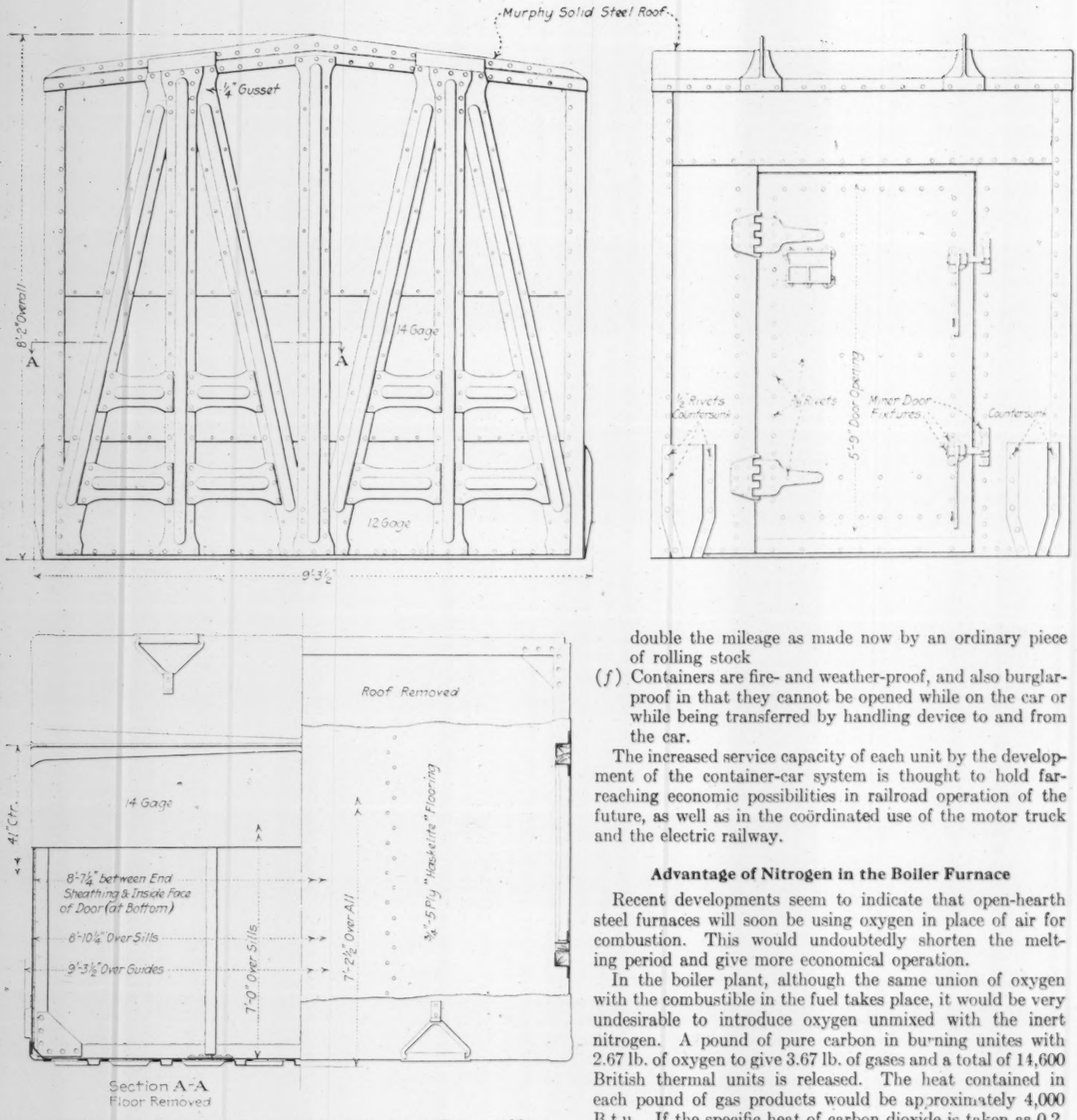

FIG. 9 GENERAL ARRANGEMENT OF THE NEW IMPROVED TYPE OF MAIL CONTAINER

Note the eyelets for lifting and handling at the top.

SUMMARY

A summary of the prime advantages of the container-car system is as follows:

(*a*) It will furnish a means of expediting delivery of less-than-carload lots of commodities by eliminating the time and expense of rehandling, checking and trucking

(*b*) It will eliminate costly crating and packing

(*c*) The immediate unloading and loading of containers at terminal points eliminates the item of demurrage, at the same time promptly releasing rolling stock, clearing the yards of cars and reducing congestion

(*d*) It will eliminate the piecemeal loading of cars at railway sidings in exposure to all kinds of weather

(*e*) It will tend to keep the car moving at all times, making possible double the mileage as made now by an ordinary piece of rolling stock

(*f*) Containers are fire- and weather-proof, and also burglar-proof in that they cannot be opened while on the car or while being transferred by handling device to and from the car.

The increased service capacity of each unit by the development of the container-car system is thought to hold far-reaching economic possibilities in railroad operation of the future, as well as in the coördinated use of the motor truck and the electric railway.

Advantage of Nitrogen in the Boiler Furnace

Recent developments seem to indicate that open-hearth steel furnaces will soon be using oxygen in place of air for combustion. This would undoubtedly shorten the melting period and give more economical operation.

In the boiler plant, although the same union of oxygen with the combustible in the fuel takes place, it would be very undesirable to introduce oxygen unmixed with the inert nitrogen. A pound of pure carbon in burning unites with 2.67 lb. of oxygen to give 3.67 lb. of gases and a total of 14,600 British thermal units is released. The heat contained in each pound of gas products would be approximately 4,000 B.t.u. If the specific heat of carbon dioxide is taken as 0.2, the temperature resulting from the combustion with no loss would be over 20,000 deg. fahr. This temperature is far above the melting point of either furnace walls or boiler plate. While this high temperature would increase the rate of heat absorption of the boiler, the temperature of the chimney gases would be high, since the small volume of highly heated gases would not be able to throw off as much heat as is possible with a larger volume of gases.

With air entering the furnace, instead of only 2.67 lb. of oxygen combining with the carbon we have 8.87 lb. of nitrogen carried along with the oxygen. The total weight of the gases then becomes 11.54 lb. and the theoretical flame temperature is reduced to around 5,000 deg. The weight of the nitrogen mixed with the oxygen reduces the heat generated per pound of gases, thereby reducing the furnace temperature. The larger volume of temperature gases transmits the heat more efficiently to the boiler. The presence of the inert nitrogen is actually an advantage.—*Power*, Oct. 25, 1921, p. 647.

Material Handling an Important Factor in the Elimination of Industrial Waste

By H. V. COES,[1] PHILADELPHIA, PA.

It is only recently that industrial plants have been designed or laid out on a material-handling basis, and the present paper is timely in that it points out the opportunities in almost every branch of industry to reduce large wastes in material handling.

The problem of reducing the waste in material handling is not always an easy one and initial solutions are frequently complicated. However, thorough analysis will generally reveal a simple solution.

One authority postulates the principles: First, in handling material, perform only the handling operations that are absolutely essential; second, perform these operations in the way that secures the lowest cost.

Too much thought cannot be given to the selection of equipment that not only shows a saving, but fits into the general operating conditions of the plant, or suits physical conditions imposed by plant or location, and yet at the same time fits into plans for the future extension, development or rehabilitation of the plant.

THE Committee on Elimination of Waste in Industry of the Federated American Engineering Societies states, "It is peculiarly the duty of engineers to use their influence individually and collectively to eliminate waste in industry."

The Materials Handling Division of our Society is concerned with the wastes of (1) capital, (2) material, (3) labor, and (4) production, resulting from lack of or inadequateness of material-handling equipment and methods in industry and their inefficient use and operation.

Modern civilization is the direct result of the application of the principles of subdivision of labor. This in turn has resulted in inventions largely labor-saving, and material-handling devices have played an important part in this development. Yet today, in spite of equipment and methods now available, material is handled constantly in identically the same manner as in the early stages of civilization.

Why is this? In the opinion of the author it is due to a number of influences, such as

1 Ignorance of methods and equipment available
2 Lack of standardization of materials, methods, containers to be handled to permit installation of and economical use of material-handling apparatus
3 Insufficient comparative economic data
4 Improper engineering
5 Poor salesmanship and selling policies
6 Lack of a central organization to educate the public and to act as a clearing house for economic and technica information.

There has recently been published an Encyclopedia of Material Handling, prepared by recognized authorities. This is a step in the right direction and it should prove of considerable assistance, particularly in eliminating ignorance of methods and equipment. The meetings and symposiums of the Materials Handling Division of our Society will, if conducted and prepared along broad lines, aid largely in the educational campaign.

Lack of standardization of containers is a peculiarly potent deterrent to proper economic solutions of material-handling problems, particularly at express and package-freight stations, terminals, transfer points and steamship docks. The Materials Handling Division can perform a service of inestimable value to the country by forming strong committees to make an engineering study of this important problem. A proper solution would reduce waste due to loss and breakage, waste of transportation space, waste in production, and shipping costs.

It is a well-recognized fact in industrial-plant operation that the last 20 per cent of operating efficiency is the hardest to obtain, and yet shows the highest return. Thousands of plants in this country do not show an operating efficiency of more than 50 per cent, as compared with those plants that have an operating ratio as high as the present state of the art will permit. There are many reasons for this low operating ratio, but we are concerned only with the losses due to inadequate and inefficient material handling.

Industrial costs are composed of the following factors:

1 Material
2 Production labor
3 Factory burden or overhead
4 General administration expense
5 Sales expense.

As a usual thing, indirect or non-productive labor is charged out to factory burden. A very large portion of this labor is used in picking up, putting down and transporting material of all kinds. Hence one place to start in reducing factory burden is to reduce waste in labor and expense in this indirect-labor item by substituting adequate and properly adapted material-handling equipment and methods.

A Few Examples of Savings Effected

Some specific cases will help to visualize the situation better.

a In a large plant in Cleveland, Ohio, 55 men and 25 units are doing the work which today would require 550 men for handling alone, if they reverted to the old methods of five or six years ago.

b A tractor and 16 trailers reduced the yard gang from 18 to 4 men and eliminated a mile of industrial track, the salvage of which nearly paid for the initial installation.

c Mr. Max Sklovsky,[1] after an exhaustive study of material handling in his foundry, recently made the startling statement that he was handling 168 tons of material for every ton of finished castings produced, the figures for 100 tons of castings being as follows:

	Tons
Metals	2,606
Coke and lime	95
Core material	1,278
Molding sand	7,491
Equipment	5,150
Miscellaneous	200
Total	16,820

d Mr. W. G. Bridgeman[2] cites some interesting comparisons of handling costs at terminals. Two-wheeled trucks were used under the old method, electric tractors in the new method.

Terminal	Tons per man per hr., old method	Tons per man per hr., new method	Cost difference per ton
Wilmington, N. C.	0.873	3.49	$0.281
South Atlantic port	1.29	2.72	....
Cincinnati	0.722	0.918	0.14
St. Louis	1.2	1.8	....

Mr. Bridgeman further states that in his opinion 75 per cent of the freight houses in the country can increase production per man per hour anywhere from 25 to 100 per cent, and this will be accomplished mainly by the use of mechanical equipment for handling freight.

e Mr. J. A. Kreis,[3] states that their 20-ton locomotive crane "not only speeds up handling of material but pays for itself every 4½ months."

f A battery of 4 Wellman-Seaver-Morgan unloaders can now unload a 10,000-ton ore vessel in 3½ hrs. In the old days, using a clamshell bucket, the cost was around 25 cents per ton; today it is 2½ to 4 cents per ton. This cost includes overhead, interest on plant investment, and maintenance.

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[1] Manager, Ford, Bacon & Davis. Mem. Am.Soc.M.E.

For presentation at the Annual Meeting, New York, December 5 to 9, 1921, of The American Society of Mechanical Engineers. Advance copies of the paper may be obtained gratis upon application. All papers are subject to revision.

[1] Chief Engineer, Deere and Co., Moline, Ill.

[2] General Superintendent, Terminals Operating Co., New York, N. Y.

[3] Hupp Motor Car Co., Detroit, Mich.

g Table 1 is an example of the rehabilitation of a paper mill by material-handling methods. The mill was 60 years old or more, and had grown around itself in a manner that presented a number of problems difficult to solve. After a policy for rehabilitation and extension had been worked out, it was possible to predict future material-handling costs, based upon improvements that would obtain under the rehabilitation plan and application of the proper material-handling equipment to the problems in hand. The table illustrates the varied material to be handled, but one would need to know the physical handicaps at the mill to fully appreciate the necessity for and the difficulty of obtaining a right solution of the problem. The preliminary testing out and checking up of the equipment as installed indicates that the savings will be readily obtained and in some cases exceeded as operating proficiency increases.

It can thus be seen that there are opportunities in almost every branch of industry to reduce large wastes in material handling.

The Art is New and Requires an Unbiased Viewpoint

The public, industrial executives and business men generally are not in possession of sufficient data and economic facts to make them realize the astounding wastes going on all around. Engineers and manufacturers are largely to blame for this. The industrial executive usually knows how much per piece or per unit it costs to produce a given article, but rarely knows what it costs per unit to handle the materials entering into the manufacture of the article itself or the cost of handling the finished article. It is only recently that industrial plants have been designed or laid out on a material-handling basis. The writer knows of plants that do very well in normal times whose physical handicaps due to the absence of any consideration of material handling in the old days are such that it is a physical and financial impossibility to provide adequate material-handling methods and equipment for them. In many cases like these the savings in labor alone would pay a very substantial part of the fixed charges of a rehabilitated or a new plant.

For instance, a certain modern plant cost, including land, $1,500-000. It is operating today at about one-third capacity, yet the savings in labor alone pay the annual fixed charges of $145,000.

In many instances manufacturers of material-handling equipment have been remiss and short-sighted in selecting men of the wrong type to represent them, men in many instances without knowledge or comprehension of the underlying economic laws. Capital wastes, dissatisfaction, and frequently bitterness result from sale of unsuitable, inadequate or incomplete equipment.

If the manufacturer will get the engineer's point of view and the engineer the manufacturer's, and both will get the economic viewpoint, much good will result, fewer mistakes be made, and society and industry will benefit and prosper. By all means, then, let us work for right solutions of our material-handling problems. Let us be fair to each other, to ourselves, to the public, to labor, and make one dollar, not ten dollars, do the work of one. A proper attitude of mind in material-handling problems is important.

Initial Solution Not Always Best, But Perseverance Wins

The human mind apparently functions in a peculiar manner, particularly in connection with mechanical or technical problems. It seems necessary to start with the complex before the simple can be attained. This characteristic of the mind needs to be watched very closely in its relation to material-handling problems. The problems as usually presented in almost any industrial plant or terminal tend to confuse. The tendency of the mind to see the problem in all its complexities frequently leads to a complicated initial solution, but as a rule these initial solutions are rejected as the simple, less costly and more efficient solution finally evolves. We should analyze the problem, carefully determine the number of transfers and make ourselves find and retain the simple solution. Therefore, we should not be discouraged if the first solution does not yield the estimated savings that it is felt should be secured, but should persevere until a thorough analysis reveals the simple solution.

It should be the endeavor of our Materials Handling Division to place material-handling matters on a high plane; to seek the truth relentlessly and fearlessly; to secure a thorough exchange of views; to obtain a better understanding by the public, by labor, by engineers, by the manufacturer, of the real economic purpose of material handling.

Lowest Cost the Goal in Handling Materials

The initial test of any method, system or device, should be an economic one. The question of will it pay should not be begged. Capital has been wasted, pioneers discouraged, the public bewildered because of undertakings not conforming to this test.

Mr. Wm. F. Hunt[1] postulates these principles as follows:

1 In handling material, perform only the handling operations that are absolutely necessary

2 Perform these operations in the way that secures the lowest cost.

When a simple plan for handling materials has been developed, the financial returns of the installation will, in the absence of labor difficulties, largely determine the wisdom of the installation. It may pay to install apparatus and it may not, according to conditions such as:

a Constancy or intermittency of the work
b Character of the operation itself
c Results of analysis which follows.

TABLE 1 ESTIMATED ANNUAL COST OF PRESENT AND PROPOSED MATERIAL HANDLING
(Based on Average Quantities Consumed in Year 1919 and 6 Months 1920)

			Present Cost[1]			Proposed Cost[1]		Annual Saving		
Material	Unit	Average Annual Consumption	Unit	Total	Estimated New Investment	Unit	Total	Unit	Total	Equipment Selected
Alum	Ton	207	$10.60	$ 2,862	$ 5,500	$1.87	$ 505	$8.73	$ 2,357	Locomotive crane and power mule
Ash disposal	Ton	4,800	2.08	10,000	15,000	0.42	2,000	1.86	8,000	Pneumatic conveyor
Bleach	Ton	875	2.80	2,450	.....	2.00	1,750	0.80	700	Locomotive crane and power mule
Clay (China)	Ton	1,800	4.48	8,064	11,100	1.60	2,880	2.88	5,184	Pneumatic conveyor
Lime	Ton	2,500	1.60	4,000	1,950	0.50	1,250	1.10	2,750	Pneumatic conveyor
Lumber: Box	M.B.M.	1,000	4.85	4,850	400	2.25	2,250	2.60	2,600	Loco. crane and gravity conveyor
Lumber: Strips	M.B.M.	100	6.00	600	.....	3.50	350	2.50	250	Loco. crane and gravity conveyor
Pulp wood	Cord	10,000	4.10	41,000	60,000	1.67	16,700	2.43	24,300	Loco. crane and pneumatic conveyor
Rosin	Ton	250	6.55	1,637	6,000	1.00	250	5.55	1,387	Locomotive crane and power mule
Soda ash	Ton	545	2.40	1,310	500	0.50	273	1.90	1,037	Pneumatic conveyor
Sulphite pulp	Ton	5,500	4.10	23,000	14,000	1.95	10,500	2.15	12,500	Power mule
				$99,773	$114,450		$38,708		$61,065	

[1]The present costs include maintenance and repairs but no fixed charges, or other overhead items. The proposed costs include fixed charges of 20 per cent.

If labor can be saved or manufacturing conditions improved by the use of apparatus for handling material, we can readily determine how much labor will be required by the method proposed. By comparing this method with the present method, we can ascertain the probable labor saving effected.

The investment justifiable to effect the saving is the item in the investigation that is the most difficult to analyze, as it has so many variables. The figures obtained by the following method are an indication of facts and the ultimate decision must be dictated by good judgment and a general consideration of the whole situation.

How to Arrive at the Best Method

The variables are many in the work to be performed. The work may be of temporary character, infrequently done, the amount fluctuating widely, or it may be a regular daily operation, year in and year out; this item varies from 0 to 100 per cent. If the work is of a temporary nature, no saving can be made, whereas if it is of daily necessity for the future, the whole saving of reduced labor by the plan suggested is available. The true value exists somewhere between these two extremes, and it need not be difficult to

(*Continued on page 825*)

[1] Handling Materials in Factories, Wm. F. Hunt.

Code on Definitions and Values

Preliminary Draft of the Fourth in the Series of Nineteen Codes in Preparation by the A.S.M.E. Committee on Power Test Codes

IN 1918 the Power Test Committee of the A.S.M.E. was reorganized to revise and enlarge the Power Test Codes of the Society, published in 1915. The Committee is a large one, consisting of a Main Committee of 25 under the chairmanship of Fred R. Low, and 19 Individual Committees of specialists who are drafting codes for the different classes of apparatus comprised in power-plant equipment. Below is reproduced the fourth of these codes to be completed, namely, Code on Definitions and Values.

The Individual Committee which developed this Code is headed by Mr. Reginald J. S. Pigott as chairman, and consists of the following men: Prof. Lionel S. Marks, Dr. Samuel W. Stratton, Albert C. Wood, Edgar Buckingham and Fred R. Low. This Committee will welcome suggestions for corrections or additions to this draft of its Code. These should be addressed to the Chairman, care of The American Society of Mechanical Engineers.

Code on Definitions and Values

The units to be employed in reporting the results of tests made in accordance with the various Power Test Codes are enumerated in Tables 1, 2 and 3. Explanatory and other notes follow in Pars. 60 to 112, to which references are given in the tables.

TABLE 1 FUNDAMENTAL UNITS AND CONSTANTS

	Units	Abbreviations and Symbols	Definitions or Equivalent Values	Approximate Values Acceptable for Computation
1	One foot	ft.	12/39.37 of the length of the international prototype meter. (Par. 103)	
2	One pound mass	lb.	0.4535924 times the mass of the international prototype kilogram. (Par. 103)	
3	Standard gravity	g	32.174 ft./sec.^{2} (Par. 105)	
4	One pound force	lb.	A force represented by the weight of one pound mass at a place where gravity has the standard value. (Par. 105)	
5	One foot-pound	ft-lb.	The work done by 1 lb. force when its point of application moves one foot in the direction of the force.	
6	One British thermal unit	B.t.u.	1/180 of the heat required to raise 1 lb. mass of water from the ice point to the steam point. (Par. 109)	
7	Absolute temperature	T	deg. fahr. + 459.6 (Par. 108)	deg. fahr. + 460
8	Mechanical equivalent of heat	J	778 ft-lb. per B.t.u. (equiv.) (Par. 106)	778
	Heat equivalent of work	A	0.001285 B.t.u. per ft-lb. (equiv.) (Par. 106)	0.001285
9	One horsepower	hp.	550 ft-lb. per sec. (def.)	550
			33,000 ft-lb. per min. (def.)	33,000
			1,980,000 ft-lb. per hr. (def.)	1,980,000
			2,545 B.t.u. per hr. (equiv.)	2,545
			745.702 watts (equiv.)	746
			0.7457 kw. (equiv.) (Par. 107)	0.746
			737.56 ft-lb. per sec. (equiv.). (Par. 107)	738
10	One horsepower-hour	hp-hr.	2,545 B.t.u. (equiv.) (Par. 107)	2,545
11	One kilowatt	kw.	1,000 watts (def.)	1,000
			1.3410 hp. (equiv.)	1.341
			3,413 B.t.u. per hr. (equiv.)	3,413
12	One kilowatt-hour	kw-hr.	1.3410 hp-hr. (equiv.)	1.341
			3,413 B.t.u. (equiv.) (Par. 107)	3,413
13	One U. S. gallon	gal.	231 cu. in. (def.)	231
14	One Standard atmosphere (International Standard)	atmos.	760 mm. mercury at ice point and standard gravity. (Pars. 108, 109 and 112) (def.)	760
			29.9212 in. mercury at ice point and standard gravity (equiv.)	29.92
			14.6963 lb. per sq. in. (equiv.). (Par. 112)	14.7
15	One ton refrigeration	ton refr.	288,000 B.t.u. (def.). (Par. 129)	288,000

It will be noted that the approximate values in the fourth column of Table 1 will not exactly cross-check with each other; if a check is necessary, for any reason, use the more nearly exact values in the third column.

Definitions and values which are of interest to special codes only, are to be found in the "Notes on Data" (Pars. 101–157).

TABLE 2 UNITS OF CAPACITY

	Apparatus	Units
16	Steam Boilers and Superheaters	(*a*) Heat output in steam per hour. (Pars. 113, 130)
		(*b*) Actual evaporation, lb. of steam per hour, at stated steam pressure and quality or temperature, and stated feedwater temperature
		(*c*) Units of evaporation per hour = Item 19*a*/1000. (Par. 113)
17	Reciprocating Steam Engines	(*a*) Indicated horsepower at stated conditions of steam supply and exhaust
		(*b*) Brake horsepower at stated conditions of steam supply and exhaust
18	Steam-Engine Generators	Net kilowatts at generator terminals at stated conditions of steam supply and exhaust. (Par. 114)
19	Steam Turbines	Brake horsepower at stated conditions of steam supply and exhaust
20	Turbo-Generators	Net kilowatts at stated conditions of steam supply and exhaust. (Par. 114)
21	Pumping Machinery	(*a*) Gallons discharged in 24 hours at stated total suction and discharge pressures
		(*b*) Gallons per minute at stated total suction and discharge pressures
		(*c*) Water-horsepower output at stated total suction and discharge pressures. (Par. 119)
22	Compressors and Blowers, Centrifugal and Displacement	(*a*) Cubic feet of free air (or other, gas) per minute, at stated total intake pressure and temperature delivered at stated total discharge pressure
	Low-Pressure Centrifugal only (less than 20 in. water total pressure rise)	(*b*) Cubic feet of free air (or other gas) per minute, at 68 deg. fahr. and one standard atmosphere or at 0.075 lb. per cu. ft. standard density
		(*c*) Air-horsepower output at stated inlet and delivery conditions. (Par. 120)
23	Locomotives	(*a*) Indicated horsepower
		(*b*) Drawbar horsepower. (Par. 154)
24	Gas Producers	(*a*) Pounds of fuel as fired per hour, of stated high calorific value (Par. 121)
		(*b*) Hot-gas output: cu. ft. of dry gas per hour, at stated temperature and pressure, and stated high calorific value

		(*c*) Cold-gas output: cu. ft. of dry gas per hour at 68 deg. fahr. and one standard atmosphere	
		(*d*) Heat output per hour in hot gas	
		(*e*) Heat output per hour in cold gas	
25	Gas and Oil Engines	(*a*) Brake horsepower	
		(*b*) Indicated horsepower. (Par. 115)	
26	Hydraulic Turbines	Brake horsepower	
27	Hydraulic Turbo-Generators	Net kilowatts at the generator terminals. (Par. 114)	
28	Condensers	Heat transferred per hour, at stated vacuum, inlet and outlet circulating-water temperatures, and cubic feet of gases discharged by air pump per hour, measured at 68 deg. fahr. and one standard atmosphere. (Pars. 122–125)	
29	Evaporators	(*a*) Heat transferred per hour at stated temperature of evaporation, and stated temperature and pressure of steam supply. (Pars. 122–126)	
		(*b*) Pounds of raw liquor per hour	
		(*c*) Pounds of concentrate per hour	
30	Feedwater Heaters and Fuel-Oil Heaters	Heat transferred per hour at stated steam pressure and temperature and at stated inlet and outlet water or oil temperatures. (Pars. 122–128)	
31	Oil Coolers	Heat transferred per hour, at stated inlet and outlet oil temperatures, and stated inlet and outlet cooling-water temperatures. (Pars. 122–128)	
32	Economizers	Heat transferred per hour at stated pounds of flue gases per hour, inlet gas temperature and inlet and outlet water temperatures. (Pars. 122–128)	
33	Cooling Towers and Cooling Ponds	Heat dissipated per hour at stated inlet and outlet water temperatures, stated air temperatures and humidity	
34	Refrigerating Machines	(*a*) Heat absorbed per hour at stated head pressure and stated suction or cooler pressure. (Par. 122)	
		(*b*) Tons refrigeration per 24 hrs. at stated head pressure, and stated suction or cooler pressure. (Par. 129)	

TABLE 3 UNITS OF PERFORMANCE

	Apparatus	Quantities and Units	Conversion Relation
35	Boilers (including firing equipment and superheaters)	(*a*) Efficiency of boiler, superheater and furnace: ratio of heat units output to high calorific value of fuel as fired	
	Solid Fuels only	(*b*) Rate of combustion in lb. of fuel as fired per sq. ft. of grate surface per hour. (Par. 131)	
	All Fuels	(*c*) Rate of combustion in lb. of fuel as fired per cu. ft. of furnace volume. (Par. 132)	
		(*d*) Heat transferred per sq. ft. of heating surface per hour. (Par. 122)	
		(*e*) Heat developed per sq. ft. of grate surface per hour. (Par. 131)	
36	Reciprocating Engines	(*a*) Heat supplied per {i.hp-hr. / b.hp-hr.} (Pars. 140, 141)	
		(*b*) Thermal efficiency referred to {i.hp. / b.hp.} (Pars. 134–136)	2545 / (Item *a*)
		(*c*) Rankine efficiency referred to {i.hp. / b.hp.} (Pars. 144–147)	
		(*d*) Water rate, pounds of steam per {i.hp-hr. / b.hp-hr.} (Par. 152)	
37	Steam Turbines	(*a*) Heat supplied per b.hp-hr. (Pars. 140, 141)	
		(*b*) Thermal efficiency. (Pars. 134–136)	2545 / (Item *a*)
		(*c*) Rankine efficiency. (Pars. 144–147)	
		(*d*) Water rate, pounds of steam per b.hp-hr. (Par. 152)	
38	Steam-Engine Generators and Turbo-Generators	(*a*) Heat supplied per net kw-hr. (Pars. 114, 140, 141)	
		(*b*) Thermal efficiency. (Pars. 134–136)	
		(*c*) Rankine efficiency referred to net kw. (Pars. 144, 147)	
		(*d*) Water rate, lb. of steam per net kw-hr. (Pars. 114–152)	
39	Steam-Driven Pumping Engines	(*a*) Heat supplied per water hp-hr. (Pars. 140, 141)	
		(*b*) Thermal efficiency (Pars. 134–136) referred to water hp.	2545 / (Item *a*)
		(*c*) Water rate, lb. of steam per water hp-hr. (Par. 152)	
40	Steam-Driven Compressors, Blowers and Fans	(*a*) Heat supplied per air hp-hr. (Pars. 140, 141)	
		(*b*) Thermal efficiency. (Pars. 134–136)	2545 / (Item *a*)
		(*c*) Water rate, lb. of steam per air hp-hr. (Par. 152)	
		(*d*) Gross, (*e*) Net, (*f*) Indicated } horsepower per cu. ft. dry free air per min.	
		(*g*) Water rate per i.hp-hr.	
		(*h*) Volumetric efficiency	
		(*i*) Compression efficiency	
		(*j*) Mechanical efficiency	
		(*k*) Overall efficiency	
41	Direct-Drive Steam Plants	(*a*) Fuel rate, lb. of fuel as fired per {i.hp-hr. / b.hp-hr.} (Par. 154)	
		(*b*) Water rate, lb. of steam generated per {i.hp-hr. / b.hp-hr.} (Par. 152)	
		(*c*) Heat in fuel, per {i.hp-hr. / b.hp-hr.} (Pars. 140, 141)	
		(*d*) Thermal efficiency referred to {i.hp. / b.hp.} (Pars. 134, 138)	2545 / (Item *c*)
42	Steam-Electric Plants	(*a*) Fuel rate, lb. of fuel as fired per net kw-hr. (Pars. 114, 154)	
		(*b*) Water rate, lb. of steam generated per net kw-hr. (Par. 148)	
		(*c*) Heat in fuel per net kw-hr. (Pars. 114–116 and 140, 141)	
		(*d*) Thermal efficiency, overall, referred to net kw. (Pars. 132–138)	3413 / (Item *c*)
43	Steam Pumping Plants	(*a*) Fuel rate, lb. of fuel as fired, per water hp-hr. (Pars. 119, 154)	
		(*b*) Water rate, lb. of steam generated per water hp-hr. (Pars. 119, 148)	
		(*c*) Heat in fuel per water hp-hr. (Pars. 119, 140, 141)	
		(*d*) Thermal efficiency, referred to water hp. (Pars. 119, 132–138)	2545 / (Item *c*)
44	Steam Air-Machinery Plants	(*a*) Fuel rate, lb. of fuel per air hp-hr. (Pars. 120, 154)	
		(*b*) Water rate, lb. of steam generated per air hp-hr. (Pars. 120, 152)	
		(*c*) Heat in fuel, per air hp-hr. (Pars. 120, 141)	
		(*d*) Thermal efficiency, referred to air hp. (Pars. 120, 134, 138)	2545 / (Item *c*)
45	Steam Locomotives	(*a*) Fuel rate, lb. of fuel as fired per i.hp-hr. (Par. 154)	
		(*b*) Fuel rate, lb. of dry fuel as fired per drawbar hp-hr. (Pars. 154, 155)	
		(*c*) Water rate, lb. of steam per i.hp-hr.	
		(*d*) Water rate, lb. of steam per drawbar hp-hr. (Par. 152)	
		(*e*) Fuel rate, lb. of fuel as fired	

		per 100 ton-miles. (Pars. 154–156) (*f*) Heat in fuel per drawbar hp-hr. (Pars. 140, 141, 155) (*g*) Thermal efficiency referred to drawbar hp-hr. (Pars. 134, 136, 155)	$\frac{2545}{\text{(Item } f\text{)}}$
46	Gas Producers	(*a*) Hot-gas efficiency; ratio of high calorific value plus sensible heat above room temp. in hot gas, to the high calorific value of fuel as fired. (Par. 121) (*b*) Cold-gas efficiency; ratio of high calorific value of gas to high calorific value of fuel as fired. (Par. 121)	
47	Internal-Combustion Engines	(*a*) Fuel rate, lb. of fuel as burned per $\left\{\begin{matrix}\text{net i.hp-hr.}\\ \text{net b.hp-hr.}\end{matrix}\right\}$ (Par. 154) (*b*) Fuel rate, cu. ft. of dry gas of stated high cal. value at 68 deg. fahr. and one standard atmosphere, per $\left\{\begin{matrix}\text{i.hp-hr.}\\ \text{b.hp-hr.}\end{matrix}\right\}$ (*c*) Heat supplied per $\left\{\begin{matrix}\text{i.hp-hr.}\\ \text{b.hp-hr.}\end{matrix}\right\}$ (Pars. 140, 141) (*d*) Thermal efficiency referred to $\left\{\begin{matrix}\text{i.hp-hr.}\\ \text{b.hp-hr.}\end{matrix}\right\}$ (*e*) Otto or Brayton efficiency referred to $\left\{\begin{matrix}\text{i.hp-hr.}\\ \text{b.hp-hr.}\end{matrix}\right\}$ (Pars. 144, 149–151)	$\frac{2545}{\text{(Item } c\text{)}}$ $\frac{2545}{\text{(Item } e\text{)}}$
48	Gas- or Oil-Electric Units	(*a*) Fuel rate, lb. of fuel as burned per net kw. (Pars. 154, 114, 116) (*b*) Fuel rate, cu. ft. of dry gas of stated high cal. value at 68 deg. fahr. and one standard atmosphere per net kw-hr. (*c*) Heat supplied per net kw-hr. (Pars. 140, 141) (*d*) Thermal efficiency. (Pars. 134–137) (*e*) Otto or Brayton efficiency referred to net kw. (Pars. 144, 149–151)	$\frac{3413}{\text{(Item } c\text{)}}$
49	Gas-Producer Plants	(*a*) Fuel rate, lb. of fuel as fired per net $\left\{\begin{matrix}\text{i.hp-hr.}\\ \text{b.hp-hr.}\end{matrix}\right\}$ (Pars. 115, 154) (*b*) Heat in fuel per net $\left\{\begin{matrix}\text{i.hp-hr.}\\ \text{b.hp-hr.}\end{matrix}\right\}$ Pars. 140, 141) (*c*) Thermal efficiency referred to $\left\{\begin{matrix}\text{i.hp-hr.}\\ \text{b.hp-hr.}\end{matrix}\right\}$ (Pars. 134–137)	$\frac{2545}{\text{(Item } c\text{)}}$
50	Hydraulic Turbines	Efficiency of turbine; ratio of brake horsepower to water horsepower. (Par. 119)	
51	Hydraulic Turbo-Generators	Efficiency of unit; ratio of net electrical hp. to water hp. (Pars. 114–119)	
52	Surface Condensers	(*a*) Heat transferred per sq. ft. of cooling surface under stated conditions of vacuum, inlet and outlet circulating-water temperatures and cu. ft. of gases discharged per hour, at 68 deg. fahr. and one atmosphere. (Pars. 123, 124) (*b*) Heat-transmission coefficient. (Par. 157)	
53	Evaporators	(*a*) Heat transferred per hour, with stated conditions of steam supply, temperature and pressure. (Pars. 126, 127) (*b*) lb. of steam per lb. of distillate (*c*) lb. of steam per lb. of concentrate	
54	Closed Feedwater Heaters and Fuel-Oil Heaters	(*a*) Heat transferred per sq. ft. of heating surface per hour at stated conditions of steam supply, and stated inlet and outlet temperatures of water or oil. (Par. 128) (*b*) Heat-transmission coefficient	
55	Oil Coolers	(*a*) Heat transferred per sq. ft. of cooling surface per hour, at stated inlet and outlet oil temperatures, and stated inlet and outlet cooling-water temperatures. (Par. 128) (*b*) Heat-transmission coefficient. (Par. 157)	
56	Economizers	(*a*) Heat transferred per sq. ft. of heating surface per hour at stated lb. of flue gases per hour, inlet flue-gas temperature and inlet and outlet water temperatures. (Par. 128) (*b*) Heat-transmission coefficient. (Par. 157)	
57	Cooling Towers	(*a*) Efficiency. (Par. 158)	
58	Steam-Driven Refrigerating Machines	(*a*) Heat supplied in steam per ton of refrigeration, at stated conditions. (Pars. 129, 154) (*b*) Coefficient of performance; ratio of heat abstracted to indicated work, expressed in B.t.u. (*c*) Water rate, lb. of steam per ton of refrigeration, at stated conditions. (Pars. 129, 148)	

NOTES ON DATA

101 In order to render terminology consistent, the following symbols in frequent use are adopted:

H = heat content of the steam (Par. 111)
h = heat content of the liquid (Par. 111)
L = latent heat, or heat of vaporization
C_p = specific heat at constant pressure
C_v = specific heat at constant volume
V = specific volume of the vapor
V' = specific volume of the liquid
$u = V - V'$
E_o = Internal energy
P = pressure, lb. per sq. in. abs.
N = entropy of steam
n = entropy of liquid
$I = E - h$
J = mechanical equivalent of heat
A = heat equivalent of work $= 1/J$
T = temperature, deg. fahr. abs.
W = work
w = weight
Q = quantity of heat in general; not to be used for denoting the property of a particular substance in a particular state.

102 Congress has never fully exercised its constitutional power of fixing the standards of weights and measures throughout the United States. The Bureau of Standards is now the legal custodian of the standards; and in the absence of specific action to the contrary by Congress, its practice in determining the values of lengths and masses is authoritative.

103 The ultimate standard of length is the international prototype meter, of which the Bureau has the two official copies assigned by lot to the United States. Determinations of length are referred to the ultimate standard through these copies by using the relation 1 meter = 39.37 in. Similarly, the ultimate standard of mass is the international prototype kilogram, of which two official copies are in the custody of the Bureau of Standards; and determinations of mass are referred to the kilogram by using the relation 1 lb. = 0.4535924 kg. There is no legally established United States primary standard yard bar or pound mass, and the adoption of the numerical relations mentioned above is, in effect, a definition of the foot and the pound.

104 For further information, see The History of the Standard Weights and Measures of the United States, by L. A. Fischer, *Bulletin* of the Bureau of Standards, Vol. 1, p. 365 (1905).

105 *International Standard Gravity*, adopted in 1901 by the Com-

mittee of the International Bureau of Weights and Measures, has the value.

$$g = 980.665 \text{ cm./sec.}^2 = 32.1740 \text{ ft./sec.}^2$$

which is the actual value of this acceleration at sea level and about 45 deg. latitude. At other latitudes, and at sea level, the ratio of local to standard gravity is as shown in the following table:

Latitude, (deg.)	g (local) / g (standard)	Latitude, (deg.)	g (local) / g (standard)
0	0.9973	50	1.0004
10	0.9975	60	1.0013
20	0.9979	70	1.0020
30	0.9986	80	1.0024
40	0.9995	90	1.0026

For higher altitudes, subtract 1 part in 10,000 for each 1000 ft. above sea level. At an elevation of 10,000 feet at the equator, local gravity is about 1 part in 79 less than standard gravity. For latitudes between 20 deg. and 70 deg. and altitudes below 5000 ft., the maximum difference between local and standard gravity is about 1 part in 400, an amount which is ordinarily negligible for engineering purposes.

106 For the mechanical equivalent of heat, the value

$$J = 778 \text{ ft-lb. per B.t.u.}$$

is adopted: it is equivalent to 1 mean calory = 4.186 true joules.

Other values which have been used in some of the recent steam tables are: Mollier (1906), 778.28; Marks and Davis (1916), 777.52; Goodenough (1914), 777.64; Callendar[1] (1915), 777.8. The greatest difference of any of these values from 778.00 is about 1 in 1620, an amount which is devoid of physical significance because the uncertainty of the value is at least 1 part in 500 and perhaps 1 in 200. The 15 deg. calory is known to about 1 part in 2000, and the mean calory is known to be nearly the same precisim as the 15-deg. calory. But the difference between the two is not so accurately known, even its sign being uncertain. In view of this fact it is quite evident that in the value $J = 778$ ft-lb. per mean B.t.u., even the 8 is not certain, and that the use of additional figures beyond the decimal point is a purely illusory refinement.

107 With $J = 778$ ft-lb. per B.t.u. we have

$$1 \text{ horsepower-hour} = \frac{1{,}980{,}000}{778} = 2544.987 + \text{B.t.u.}$$

$$1 \text{ kilowatt-hour} = \frac{1{,}980{,}000}{778 \times 0.745702} = 3412.874 + \text{B.t.u.}$$

Since the value 778 is uncertain by more than one unit, the use of decimal places in the foregoing values is a pure waste of time and they are abbreviated to 2545 and 3413.

108 *Absolute Temperature* in fahrenheit degrees is denoted by $T°$, and temperature on the ordinary Fahrenheit scale by $t°$, the relation between the two being

$$T° = t° + 459.6$$

and the absolute temperature of the ice point being $T_o = 491.6$. The values are uncertain by about one unit in the last place given. For all ordinary engineering purposes, such as reductions of gas volumes, the values 460 and 492 are more than sufficiently accurate.

109 *Ice Point and Steam Point.* The ice point is 32 deg. fahr. and the steam point 212 deg. fahr., both at one standard atmosphere.

110 *Internal Energy of a Substance.* When a pound of substance is brought from one state to another, for example, when a pound of water at 100 deg. fahr. and 50 lb. per sq. in. pressure is changed into steam at 100 lb. per sq. in. pressure and 70 deg. superheat, the amount of heat required for the change is not definite but depends altogether on the "path" of the change, i.e., on the series of intermediate states. But the sum of the heat put into, and the heat equivalent of the work done on the pound of substance during the change of state is definite and depends only on the initial and final states and not on, the path of the change. This sum is the value, expressed in heat units, of the energy that must be added to the pound of substance to produce the change, or it is the increase of the *internal energy*, in B.t.u. per lb., during the change. Since we are always concerned with *changes* of internal energy and not with absolute values, the internal energy may arbitrarily be set equal to zero at any convenient standard or normal state, such as 32 deg. fahr. and one atmosphere pressure. When such a convention has been adopted, the value of the internal energy in any other state is thereby fixed; and if the necessary data are available, it may be tabulated. Internal energy is denoted by the symbol E and expressed in mean B.t.u. per lb. of substance.

111 *Heat Content.* Let V be the volume in cubic feet, and E the internal energy in B.t.u. of one pound of a fluid at the pressure p in lb. per sq. in. Then the important quantity

$$H = E + \frac{144pV}{J} = E + 144\ ApV \text{ B.t.u. per lb.}$$

has been called the "total heat," "heat of formation" or "heat content" of the fluid, no one of the names being very satisfactory. The first is the most usual; but the necessity of using the adjective "total" in its ordinary sense sometimes makes it difficult to avoid ambiguity when the word is also being used with a special technical meaning in the compound noun "total heat." The name "heat content" will therefore be used for the quantity denoted above by H. When the substance is all in the liquid state, the symbol h will be used instead of H, and h thus denotes what is commonly called the "heat of the liquid."

112 The *standard density of mercury* at 32 deg. fahr. is 13.5955 grams per cu. cm. (Kaye & Laby, 1918.) The mean cubical expansion between 32 deg. fahr. and 212 deg. fahr. is 0.0001014 per deg., and from 32 deg. to 110 deg. fahr. it is 0.0001010.

113 *Units of Evaporation.* If it is desired to reduce B.t.u. output per hour to *units of evaporation*, divide by 1000. The use of the boiler horsepower (33,479 B.t.u. per hr.) is discontinued. The above changes are made for the following reasons: The boiler horsepower as originally standardized by the A.S.M.E. in 1889 was based on a conventional engine water rate of 30 lb. of steam per hp-hr. at 70 lb. gage pressure and feedwater at 100 deg. fahr. This corresponds to 34.5 lb. evaporated from and at 212 deg. fahr. At the present time, water rates vary from 8 lb. per b.hp. hr. in large condensing turbines to 50 or 60 lb. for small non-condensing units, and the boiler horsepower has no connection whatever with the water rate of the engine. It has never been used on the Continent or in England, and in the United States, marine boilers are rated in horsepower according to the hp. and water rate of the engines they serve. The unit has therefore become archaic, and it is better to state capacity in B.t.u., or in multiples of B.t.u. Under the boiler-horsepower definition, the unit of evaporation is the latent heat of vaporization at 212 deg., the value for which has varied with the steam tables from 965 to over 970 B.t.u. per lb. The statement of capacity or performance in B.t.u. is basic, and as the computations must in any case be made in B.t.u. at some point in the calculations, it is convenient to omit other arbitrary units as unnecessary. The objection that has been raised that capacity in B.t.u. gives large numbers is hardly worth consideration; it is only necessary to head the columns "units of evaporation" (1000 B.t.u.) which is but three per cent different from "equivalent evaporation" as now used, or "million B.t.u.," in which case the figures are smaller than when stated in boiler hp. The rating of boilers for size only, in square feet of heating surface, should be adopted; the area method has been in use for years in Europe, and in view of the fact that the ultimate steaming capacity per square foot is dependent solely on amount of fuel fired, it is a suitable unit, as not involving capacity.

114 *Net Output.* For any kind of separately excited engine or generator, the net output is expressed by the following formula:

Net kw. = gross kw. (main unit)—kw. excitation at collector rings

Net output where direct connected exciters are employed, is expressed by the following formula:

Net kw. = gross kw. (main unit) plus gross kw. exciter—kw. excitation at collector rings.

The gross kw. of both main unit and exciter is to be measured at the generator terminals. Further correction must be made if separately driven ventilating fans are employed, by substituting kw. to fan motor, or as determined by prior agreement, if the fan is not motor-driven.

115 *Net I.Hp.* for internal combustion engines, is the i.hp. of

[1] Callendar's fundamental value is 1 pound-degree centigrade = 1400.00 London foot-pounds, the British foot and pound mass being sensibly identical with the U. S. values, while the value of gravity at London is $g = 981.19$ cm./sec.^{2}.

main cylinders minus the i.hp. of auxiliary cylinders for scavenging and injection. Where possible the net output should be in b.hp., eliminating all corrections. I.hp. is, strictly speaking, not a true output, inasmuch as it does not represent the power available for use at the engine shaft.

116 For complete power stations, gross output is the sum of the gross outputs of individual units. The difference between gross and net outputs is the kw. used for lighting, auxiliaries and house service and has the same character (necessary loss) for the complete plant as friction or excitation for an individual unit. It will be seen the term "net" is used to indicate that output which is available for use, outside the main unit, or plant, as the case may be.

117 *Rate of Combustion* is defined in two ways; the first is confined to solid fuels. For this case it is the pounds of fuel as fired per square foot of grate surface per hour.

118 Rate of combustion for the second case is used for all fuels, and comprises the pounds of fuel as fired per cubic foot of furnace volume per hour. For gas only, it may be stated as the cubic feet of gas as fired per cubic foot of furnace volume per hour.

119 Water horsepower is to be computed from the equation—

$$\text{Water hp.} = \frac{\text{(lb. of liquid per min.)} \times \text{(total head in ft.)}}{33{,}000}$$

Both suction and discharge heads are to be total heads, as given by the impact tube, except in cases where the velocity head is less than 0.2 per cent of the total head. In the latter case static pressure, as usually taken by pressure gages, may be used.

If the total head is given as a difference of pressure, the value to be used in the foregoing equation is to be found from the formula

$$\text{Head in feet} = 4.476 \times \frac{\text{Pressure difference in lb. per sq. in.}}{\text{Actual density of water in lb. per cu. ft.}}$$

where $4.476 = 144/32.174$.

Water horsepower for pumps is the energy supplied to the water or other liquid by the pump in unit time. In the case of hydraulic turbines it is the available energy in the water to be employed by the turbine in unit time.

120 *Air Horsepower* (air hp.) is defined as the horsepower that would be required to compress the actual air output of the compressor or blower, if there were no friction and no clearance, if the inlet and outlet pressures were constant, and if the compression were adiabatic.

The suction and discharge pressures must be the total pressures as obtained with the impact tube, so as to include velocity head, except in those cases where the difference of velocity head at inlet and discharge is less than 0.2 per cent of the total head, in which case the usual static pressures given by pressure gages may be used.

121 *Calorific Value* as used in the tables, for solid and liquid fuels, is in all cases the high heat value per pound on complete combustion. The calorific value for gas is the high heat value per cubic foot. The low heat value is not to be used. The standardization on high heat values is adopted in order that all heat apparatus shall be charged with heat supplied, on the same basis. If the high heat values are used for some heat engines, and the low values for others, the efficiencies and other performance figures will not be comparable.

122 *B.t.u. Transferred per Hour.* In heat-transfer apparatus heat is transferred, or flows, from a region of higher to a region of lower temperature, without change of total quantity. The heat is nearly always given up or received by a fluid, and the rate of transfer is determined by measuring the rate at which the fluid gains or loses heat. Usually, as in surface condensers, evaporators, etc., both sides of the apparatus contain fluid, and measurements may be made on either of the fluids. If the apparatus is well insulated or is at nearly the same temperature as its surroundings so that the external heat transfer is negligible, the rate will be the same in which ever way it is found, but different methods may be most suitable in different cases.

123 *Surface Condensers.* Let M = total pounds of cooling water per hour and let t_1 and t_2 = its mean inlet and outlet temperatures. Then the rate of heat transfer is—

$$Q = Mc(t_2 - t_1) \text{ B.t.u. per hr.}$$

this being the rate at which the water receives heat.

124 It will usually be more convenient to make the measurement on the steam side. Let W = total pounds of steam condensed per hour; let H_2 = heat content, in B.t.u. per lb., of the steam as it enters the condenser; and let h_2 = heat content in B.t.u. per lb. of the water in the hot well. Then the rate of heat transfer from the steam is—

$$Q = W(H_2 - h_2) \text{ B.t.u. per hr.}$$

The "heat of the liquid" h_2 may be found from the steam table if the back pressure is known, but the value of H_2 has to be determined indirectly because the dryness factor of the steam cannot well be observed, and H_2 can therefore not be found directly from the steam table.

125 The value of WH_2 is to be found from the equation

$$WH_2 = WH_1 - A - R$$

where H_1 = heat content of initial steam from the steam table
A = extraction in B.t.u. per hr.
R = heat lost by the engine to the surroundings in B.t.u. per hr. (commonly but incorrectly called "radiation loss").

(*a*) For reciprocating engines—

$$WH_2 = WH_1 - \text{i.hp.} \times 2545 - R$$
$$= WH_1 - \frac{\text{b.hp.} \times 2545 - R}{\text{mech. effy.}}$$

(*b*) For steam turbines—

$$WH_2 = WH_1 - \text{b.hp.} \times 2545$$

(*c*) For turbo-generators—

$$WH_2 = WH_1 - \frac{\text{kw.} \times 3413}{\text{generator effy.}}$$

For turbines the heat loss R and the bearing and gland friction are negligible: all other losses appear as reheat in the steam.

126 *Evaporators.* Let M = pounds evaporated per hour; h = heat content of the entering liquid in B.t.u. per lb. and H = heat content of the issuing vapor. Then the rate of heat transfer is—

$$Q = Mc(H - h) \text{ B.t.u. per hr.}$$

127 If the quality of the entering steam is known, so that its heat content may be found from the steam table, we also have—

$$Q = W(H_2 - h_2) \text{ B.t.u. per hr.}$$

where W = total pounds of steam condensed per hour
H_2 = heat content of entering steam
h_2 = heat content of condensed water.

When there is heat loss to the surroundings the second formula will give the higher result, and the first is to be preferred.

128 *Feedwater Heaters, Fuel-Oil Heaters, Coolers and Economizers.* The rate of heat transfer is—

$$Q = Mc(t_2 - t_1) \text{ B.t.u. per hr.}$$

where M = total pounds of water or oil passed through per hour,
c = the specific heat of the substance (for water $c = 1$)
$(t_2 - t_1)$ = the rise or fall of temperature.

129 *One Standard Ton of Refrigeration* is defined as the absorption of 288,000 B.t.u. irrespective of time.

The unit of capacity, one ton per day, will then be $\frac{288{,}000}{24 \times 60} = 200$ B.t.u. per min.

130 *Total B.t.u. per Hour Output in Steam from Boiler:*

$$Q = W(H_1 - h_2) \text{ B.t.u. per hr.}$$

where W = total pounds of water evaporated per hour
H_1 = heat content of the steam generated in B.t.u. per lb.
h_2 = heat content of feedwater in B.t.u. per lb.

H_1 and h_2 to be found from the steam table.

131 *Grate Surface* is defined as the total horizontal projected area of grates or stoker, including dump plates, ash crushers, etc. it is also stated as the total projected area of all surface supporting coal, within the front wall of the furnace. This definition will cover cases in which the bridge wall is undercut for ejection of refuse.

132 *Total Furnace Volume* is defined for horizontal return tubular boilers and water tube boilers as the cubical contents of the furnace between the grate and the first place of entry into or between tubes. It therefore includes the volume behind the bridge wall as in ordinary horizontal return tubular boiler settings, unless manifestly ineffective, (i.e., no gas flow taking place through it), as in the case of waste-heat boilers with auxiliary coal furnaces,

where one part of the furnace is out of action when the other is being used. For Scotch or other internally fired boilers it is the cubical contents of the furnace, flues and combustion chamber, up to the plane of first entry into the tubes.

133 *Heating Surface* for boilers and superheaters comprises the total area of all the surface in actual contact with the hot gases. This definition implies that tubes of water-tube boilers will be figured on outside diameter, and of fire-tube boilers, on inside diameter. The amount of boiler surface should be stated separately from superheater surface. The heat transfer is always to be figured on total heating surface.

Heating or cooling surface, for condensers, evaporators, feedwater heaters, oil heaters and oil coolers, will be figured on total surface in contact with both fluids, and based on outside diameter of tubes. Heating surface for economizers will be figured the same as for boilers and superheaters.

134 *Thermal Efficiency* based on any unit of output is defined as the heat equivalent of the work done divided by the heat supplied.

135 *The Heat of the Liquid*, for steam engines and turbines, is to be taken at the temperature corresponding to the back pressure.

136 *Thermal Efficiency* is expressed as follows:

For steam engines:

$$\text{Indicated thermal efficiency, } E_i = \frac{2545}{W_i(H_1 - h_2)}$$

For steam engines and turbines:

$$\text{Brake thermal efficiency, } E_b = \frac{2545}{W_b(H_1 - h_2)}$$

For engine-generators and turbo-generators:

$$\text{Combined thermal efficiency, } E_k = \frac{3413}{W_k(H_1 - h_2)}$$

where W_i = steam consumption referred to indicated horsepower
W_b = steam consumption referred to brake horsepower
W_k = steam consumption referred to net kilowatts
H_1 = heat content, B.t.u. per lb. at the throttle
h_2 = heat of the liquid, B.t.u. per lb., corresponding to pressure in exhaust.

137 *The Thermal Efficiencies* of the internal-combustion engine are expressed as follows:

$$\text{Indicated thermal efficiency, } E_i = \frac{2545}{Q_i}$$

$$\text{Brake thermal efficiency, } E_b = \frac{2545}{Q_b}$$

$$\text{Combined thermal efficiency, } E_k = \frac{3413}{Q_k}$$

where Q_i = B.t.u. per i.hp.
Q_b = B.t.u. per b.hp.
Q_k = B.t.u. per net kw.

138 The thermal efficiency for complete plants will be expressed in the same way, using i.hp., b.hp., net kw., water hp., air hp., etc., as the reference. For example, the *overall thermal efficiency* of a coal-fired electric plant is—

$$\frac{3413}{\text{Calorific value of coal} \times \text{lb. coal per net kw-hr.}}$$

139 It is to be noted that in present usage the terms "thermal efficiency" and "cycle" are not limited to the thermodynamic sense only. They are therefore not to be interpreted in the strictly special manner usual in thermodynamics, as used in the Code: their use in the general sense is established by custom and is perfectly understandable.

140 *Heat Supplied*, referred to any unit of output, is defined as the heat input per unit of output.

141 *Heat Supplied*, for steam engines and turbines, is expressed as the total heat content of the steam supplied less the heat of the liquid at exhaust pressure. For complete steam plants, for gas producers, internal-combustion engines and internal-combustion plants, it is expressed as the high calorific value of the fuel per lb. as fired, times the pounds fired.

142 *The Initial Steam Pressure* for any steam engine or turbine is defined as the average pressure obtained in the supply pipe directly preceding the throttle valve of the engine or turbine. The same definition will apply to any other apparatus using steam and using a stop valve to start or stop it.

143 *The Back Pressure or Exhaust Pressure* for steam engines or turbines is defined as the pressure obtained at or as near as possible to the exhaust flange, and it shall also be considered to be the pressure obtaining in the condenser, where the condenser is directly connected to the turbine or engine-exhaust flange (applied only to steam prime movers).

144 *Engine Efficiency* is the general term used for the ratio between heat input per unit of output for the ideal cycle, and heat input per unit of output for the actual engine. It may also be expressed as $\frac{E_i}{E_r}$, $\frac{E_b}{E_r}$ or $\frac{E_k}{E_r}$; and in other ways; all of which are simply transpositions of the same quantities. The ideal cycles are different for the different classes of prime movers. For steam engines and steam turbines, the ideal is the Rankine cycle, and the above ratio will be called the "Rankine efficiency." For explosion internal-combustion motors the Otto cycle is the ideal, and the ratio will be called the "Otto efficiency." For constant-pressure internal-combustion motors the Brayton cycle is the ideal, and the ratio will be called the "Brayton efficiency." Other cycles may be employed as ideals for comparison, as prime movers are developed, but are not required at present. The Carnot cycle, although it affords the highest thermal efficiency, is not employed in any commercial prime mover at present, and therefore is of no practical value in these codes.

145 *The Rankine Steam Cycle* consists of (*a*) admission at constant pressure and temperature, (*b*) isentropic expansion to the back pressure, (*c*) exhaust at constant pressure and temperature, (*d*) return to the boiler of the equivalent amount of feedwater, taken at the temperature and pressure of the exhaust steam; there is to be no heat leakage and no friction, so that all stages of the cycle are ideally perfect.

146 *Thermal Efficiency of the Rankine Cycle:*

$$E_r = \frac{H_1 - H_2}{H_1 - h_2}$$

where H_1 = heat content of steam, at initial condition
H_2 = heat content of steam after isentropic expansion
h_2 = heat of the liquid at exhaust pressure.

The foregoing formula is not exact because it neglects the work of the feed pump, but this is in fact negligible, so that the formula may be used without correction.

147 *Heat Input of the Rankine Cycle* is expressed as

$$\frac{(H_1 - h_2)\,2545}{H_1 - H_2} = \frac{2545}{E_i} \text{ for i.hp.}$$

$$\frac{(H_1 - h_2)\,2545}{H_1 - H_2} = \frac{2545}{E_b} \text{ for b.hp}$$

$$\frac{(H_1 - h_2)\,3413}{H_1 - H_2} = \frac{3413}{E_k} \text{ for net kw.}$$

148 *The Otto Cycle* consists of (*a*) adiabatic compression, (*b*) heating at constant volume (explosion), (*c*) adiabatic expansion to the original volume, and (*d*) cooling at constant volume (exhaust).

149 *The Brayton Cycle*, (of which the Diesel cycle is a modification), is defined as (*a*) adiabatic compression, (*b*) heating at constant pressure, (*c*) adiabatic expansion to the back pressure, and (*d*) exhaust at constant pressure.

150 *Thermal Efficiency of the Otto and Brayton Cycles* is expressed as

$$E_o = 1 - \left(\frac{P_a}{P_b}\right)^{\frac{\gamma - 1}{\gamma}} = 1 - \left(\frac{V_b}{V_a}\right)^{\gamma - 1}$$

where E_o = thermal efficiency of the Otto or Brayton cycle.
P_a and V_a = absolute pressure and volume at beginning of compression.
P_b and V_b = Absolute pressure and volume at end of compression.
γ = ratio of specific heats $\frac{C_p}{C_v}$ equals 1.41 when air, is used in compressive gas cycles.

(*Continued on page 821*)

SURVEY OF ENGINEERING PROGRESS

A Review of Attainment in Mechanical Engineering and Related Fields

AERONAUTICS

THE Z R-2 DISASTER. The Report of the Court of Inquiry into this disaster, issued in London in October, adds little information to what was previously available.

The cause of the accident in the opinion of the court was that the structure failed in the rear of the after-end cars and the hull broke in two while the ship was being subjected to rudder and elevator tests at a speed of about 45 to 50 knots.

It appears that almost extreme helm, with quick reversal, was being used at the time and the swing of the stern resulting from this maneuvering set up greater stresses in the hull framing than could be resisted.

The Aeronautical Research Committee and the Admiralty are conducting additional and independent investigations, the findings of which have not yet been published.

The editorial in *Engineering* from which the above information has been taken makes the comment to the effect that the airship was not, as might have been expected, the embodiment of the skill and experience of British airship designers as a whole. The disaster might possibly have been prevented by a very careful investigation of the design after one of the preliminary trials in which the weakness of some of the girders amidships became evident, as proved by the fact that these particular girders were reinforced before the final trial. (*Engineering*, vol. 112, no. 2911, Oct. 14, 1921, pp. 545, *g*)

THE D.H. 29 MONOPLANE. Description of the new DeHaviland monoplane and of interest because it is the first commercial aeroplane designed and built in England with wings of the cantilever type. (In addition to the monoplane described here another one was built for the Air Ministry, the details of which are confidential.)

The wing is of thick section, high-lift type, with a high L_c maximum, giving the same landing speed for a much higher wing loading. The wing area of the monoplane designed to carry twelve people is the same as that of the D.H. 4, which was quite a small aeroplane and well known in this country.

The fuselage shows a total absence of wire bracing. The cabin portion of the fuselage is triangulated by deeply splined H-section diagonal struts, and it is of interest to note that three of these transmit the weight of the wing to the points on the lower longerons where the struts of the undercarriage are attached.

In section the fuselage is usual, inasmuch as the floor is considerably wider than the deck. The main reason for this appears to be the desire to get a wide base for the attachment of the undercarriage struts.

In the design of the passenger cabin a consistent effort was made to secure comfort and safety for the passengers. In connection with the latter, emergency doors were provided in the roof. Also plywood construction of the fuselage was adopted in conjunction with water-tight door joints, in order to enable the machine to remain afloat for a considerable period, should a forced descent in the sea ever have to be made.

The engine is powered with a 450-hp. Napier-Lion engine mounted high in the nose. The radiator is placed below and behind the engine. As to the gasoline tanks, two of them are placed in the leading edge of the wing, one on each side. It is intended to employ a low-pressure gasoline system.

The monoplane is of particular interest as indicating a determined attempt to test out to the limit the possibilities of cantilever wing construction. In this construction experience with the D.H. 29 is enlightening in showing that some of the assembly difficulties with a cantilever wing are not as formidable as they were believed to be. Thus, it has been generally believed that with thick section high-lift wings it was necessary to have a rigid covering, such as plywood and sheet metal, as such wings have been thought to be very sensitive to quite minute changes in curvature, such as may be caused by a slight sagging of the covering. Altogether the D.H. 29 is covered with fabric in the ordinary way and there does not appear to have been any trouble due to this cause.

The details of control, especially the lateral control at or near the stalling angle, are given in the original article. (*Flight*, vol. 13, no. 39 666, Sept. 29, 1921, pp. 641–647, illustrated, *dA*)

AIR MACHINERY (See Refrigerating Engineering)

CORROSION

Corrosion of Cast Iron

THE SELF-CORROSION OF CAST IRON AND OTHER METALS IN ALKALINE SOILS, W. Nelson Smith and Dr. J. W. Shipley. Data of research carried out in Winnipeg, Canada, and covering the electrochemical phenomena underlying corrosion of metals in certain soils, soil analysis, effect of moisture content and salts in solution, and products of corrosion. The first of the authors is consulting electrical engineer of the Winnipeg Electric Railway Co., and the second is assistant professor of chemistry at the University of Manitoba.

The investigation was primarily undertaken in order to derive proof that the external corrosion of city water mains in areas where any stray electric current present would necessarily be flowing into the pipe and not out of it, must be due to the action of the soil and not to the passage of stray current, which can only dissolve iron where it leaves the pipe.

The experimental work was carried out both in the field and laboratory with pieces cut from cast-iron pipe and bars of cast iron immersed in various salts. The following conclusions were drawn:

1 The corrosion of cast iron by the salt solutions found in natural soil is readily accomplished under natural conditions without access of stray current. This corrosion is of the so-called graphitic pitting type, by which is meant the commonly observed condition of the material remaining in place, which is invariably of a soft, spongy texture with part of the iron dissolved out, the remainder resembling graphite in consistency.

2 Magnesium salts are the most corrosive of the soil salts, and magnesium sulphate, which was found wherever a cast-iron pipe had been destroyed, is apparently the most effective of the salts experimented with.

3 Local action induced by naturally occurring concentration cells may easily be a factor in the pitting of cast iron exposed to salts of varying concentration.

4 Slight pitting corrosion was found in pieces of cast iron exposed to the action of small samples of wet soil and intermittently heated, even in the short period of 40 days, and with only a limited supply of water as compared with conditions in natural ground, no impressed electromotive force being present.

The products of corrosion on cast-iron pipes were next investigated and it was found that they consisted mainly of metallic iron, ferrous oxide, ferric oxide, and silicious graphitic residue, in addition to which, however, were found also ferrous phosphate and iron sulphide, showing the great complexity of corrosion processes.

The moisture content is apparently an important element in the rapidity of corrosion on pipe. It was generally found that soils of Winnipeg and vicinity when in contact with iron can of themselves set up an appreciable electromotive force like that of a battery, amply sufficient to decompose the iron. Moreover, indications become available to the effect that lead and copper are also affected by self-corrosion.

Thus, a small new lead plate was buried in contact with a clay soil and some black surface soil in a sealed glass container, with plenty of moisture present, and when removed at the end of 4½ months was found to be pitted with little cavities about as big as pin heads, which were filled with white pellets of crystallized lead sulphate. No heat was applied during the experiment. A copper ground plate buried below the basement floor of the Manitoba Government Telephone Exchange in St. Boniface, corroded in 18 months or less after installation.

As regards preventive treatment, it is stated that usual treatments with tar, dips and paints have generally proved futile, but the authors believe that the life of cast-iron pipe in a wet, salty soil could be lengthened considerably by backfilling the pipe trench with quartz sand or washed gravel rather than depending on a thin layer of paint.

E. L. C. Forster, chemist on the Dominion Health Board staff, has advised that a very small percentage of aluminum with cast iron has prevented microscopic shrinkage cracks in the surface of castings that otherwise formed when the casting cooled, and that this property was utilized in making munitions during the war. The absence of minute surface cracks might render the silicious coating of cast-iron pipe more impervious to salt solutions. Any method of casting pipe which could produce a flawless exterior coating of silicate, that would resemble enamel would certainly retard the solution of the iron. (Paper presented at the 10th General Professional Meeting of the Engineering Institute of Canada, Saskatoon, Aug. 11, 1921. *The Journal of The Engineering Institute of Canada*, vol. 4, no. 10, October, 1921, pp. 527–535, *ep*)

ENGINEERING MATERIALS (See also Corrosion)

LAFARGE QUICK-HARDENING CEMENT, Edwin C. Eckel. Data on a cement developed during the war, of which the most remarkable property is that it hardens with great rapidity so as to make a good, heavy gun platform within 24 hr.

This new cement is a lime-aluminate and differs from normal portland cement in the almost total absence of silica; it is prepared by actual fusion and not by mere clinkering and is almost white in color.

It is made in a small blast furnace which is charged with coke, limestone and bauxite. When the furnace is in steady operation it turns out from 10 to 15 metric tons a day of fused slag, which, cooled and ground, is the new cement. It contains, roughly, 50 per cent lime, 40 per cent alumina and 10 per cent other additions, such as silica.

Its cost is said not to vary materially from that of the normal portland cement. It has a normal setting time but hardens, as mentioned above, with far greater rapidity. It is believed that it would be of practical advantage for use in marine work which has to be completed between two tides. It is said to possess great resistance to the decomposing effects of sea water and similar solutions, as indicated by the experience of an important railway in France. (*Engineering News-Record*, vol. 87, no. 14, Oct. 6, 1921, pp. 566–567, *d*)

GENELITE, AN IMPROVED BEARING ALLOY, E. G. Gilson. Data on a new synthetic bronze-graphite bearing material developed by the Research Laboratory of the General Electric Company. It is claimed that it does not seize nor score when bearing surfaces are permitted to run dry through negligence or accident.

The material has uniformly distributed throughout its mass approximately 40 per cent by volume of very finely divided graphite. It is made by thoroughly mixing the finely powdered oxides of the metals composing the bronze with sufficient graphite to completely reduce them and leave in excess of this amount the graphite content desired in the finished material. This reduction process must be carried on at temperatures below the welding point, and therefore the material cannot be cast, but is shaped by molding under high pressure while still in powdered form. As the powder does not flow readily under pressure, it is necessary to use a complicated mold and confine this operation to only the simplest shapes. The material cannot be machined easily by ordinary methods as it rapidly dulls the cutting tool. It grinds easily, however.

Genelite has not the physical characteristics of ordinary bronze. Its tensile strength and elongation are low and the ultimate strength and yield point are practically identical at 8000 lb. per sq. in. Under compression, however, it will withstand 50,000 lb. per sq. in. The structure of the material is of a porous nature and it will absorb from 2 to 3 per cent by weight of oil.

The self-lubricating property of genelite is taken advantage of in many applications, such as in tilting motors where the standard oil-ring practice cannot be used because the oil will run out of the bearings when tilted.

Owing to its spongy structure genelite should be given a greater allowance for pressed fits than is customary with other materials and it need not be held to such close limits. (*General Electric Review*, vol. 24, no. 11, Nov. 1921, pp. 940–951, 3 figs., *d*)

FUELS AND FIRING (See also Transportation)

Cheap Oxygen Manufacture

THE INFLUENCE OF CHEAP OXYGEN ON ECONOMY OF FUEL AND OF TIME, E. A. W. Jefferies. The author describes a process of oxygen separation which, in general, consists of liquefying the air by compression and expansion. The nitrogen is next distilled off, but the distillation is carried on under the same pressure to which the air is originally compressed. By this method the nitrogen leaves the steam under the original pressure and can then be heated to increase its volume and power capacity and used in a piston engine to drive the compressor.

For this purpose only a comparatively little heat is required, so that the entire process requires only fuel, but not external power, to operate.

The new method has been demonstrated on a large scale by the Government in the separation of helium from the natural gases of Texas.

A claim is made that oxygen can be produced in large quantities by this process at a price of the order of 8 cents per thousand cubic feet.

The remainder of the paper is devoted to the use of oxygen in gas producers, open-hearth furnaces, blast furnaces, and industrial applications, and made possible its low price. (*Association of Iron and Steel Electrical Engineers*, vol. 3, no. 10, October 1921, pp. 471–477, *dg*)

POWDERED-COAL FIRING IN INDUSTRIAL PLANTS. Report of Commission appointed by the Minister of Public Works to investigate the best methods of utilization of fuels, reprinted from an official publication of the French Government. The purpose of the report was to investigate in view of the extensive application of powdered-coal firing in America to what extent the same would be suitable under French conditions. Only the conclusions are given here.

The report cites the following points in favor of powdered-coal firing—

1 The very high utilization of the value of the fuel whether the latter belongs to the class of rich or poor fuel;
2 The possibility of burning successfully low-grade fuels, some of which could not otherwise be burned at all today; easy handling of the fire, its instantaneous starting and extinction, and, under certain conditions, a great flexibility in regulation.

As against the employment of powdered fuel are cited the liability to accidents, troubles due to ash and clinker formation and high first cost of installation.

As regards these objectionable features, it is pointed out, however, that accident liability may be largely reduced by greater knowledge of past experiences with this fuel and by proper and careful precautions. The trouble due to ash and clinker formation appears to have been already largely eliminated by the use and good handling of suitable apparatus, and as regards the high first cost of installation it is stated that in certain cases this may be more than compensated for by economies of operation due either to lessened consumption or the use of cheaper grades of fuel.

On the whole the report recommends the subject of powdered-fuel burning to the earnest attention of French industries. (*Mémoires de la Société des Ingénieurs Civils de France*, vol. 74, series 8, nos. 4, 5 and 6, April to June 1921, pp. 123–172, *g*)

HYDRAULIC ENGINEERING

Pelton-Wheel Bucket Efficiencies

COMPARATIVE TESTS ON PELTON-WHEEL BUCKETS OF DIFFERENT INCLINATIONS. An investigation for the purpose of determining directly the inclination of the buckets that gives the best efficiency, carried out at the Hydraulic Laboratory of the Engineering Division, Kyushu University.

The wheel is 520 mm. (20 in.) in diameter and designed to develop 6 b.hp. under a head of 30 m. (98.4 ft.) at 400 r.p.m. The wheel carries 22 ellipsoidal buckets.

Experiments were made with four different inclinations of buckets and the results are presented in the form of tables and curves. It was found that when the central ridges stand at right angles to the jet axis at the mean position between the beginning and end of full jet, the best efficiencies are obtained for all gates except one-quarter gate. At seven-eighths gate, which corresponds nearly to the normal load of the wheel, case 2 has an efficiency of 83.2

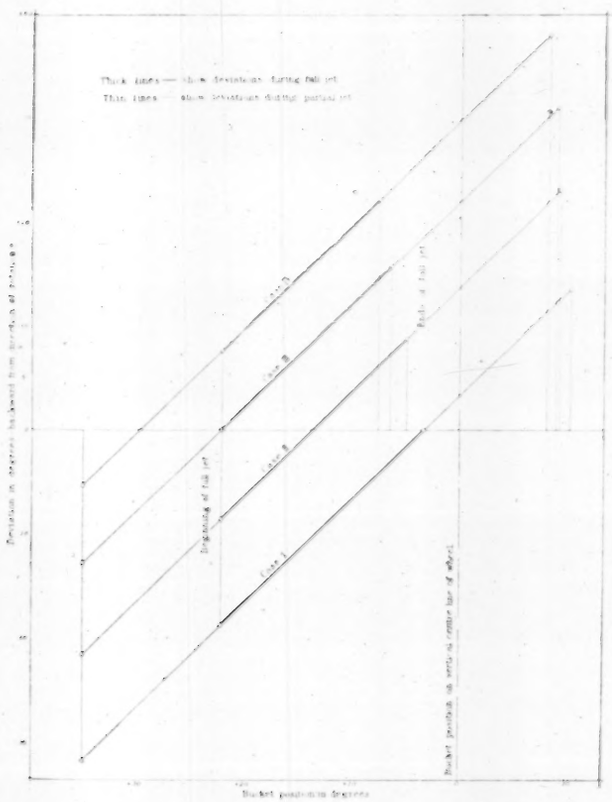

FIG. 1 DEVIATION OF BUCKET PLANES FROM NORMAL TO JET AXIS

per cent, exactly 10 per cent greater than in case 4 when the relative entrance velocity of the jet is at right angles to the ridge at the same mean position of the bucket. In the order of efficiencies, case 1 is next to case 2, then comes case 3 and lastly case 4. These variations of maximum efficiencies in the four cases may be explained briefly as follows: When it is remembered that the buckets under consideration are so shaped that the normal cross-sections of the double ellipsoidal deflecting surface of the bucket are all at right angles to the plane containing the central ridge and the exit edges (hereafter called the bucket plane), it is evident that the impulsive action of the jet will be most efficient if the buckets can move parallel to themselves standing always at right angles to the jet, in which case the absolute deflection of the mid particles of the jet will always take place on the axial plane through the jet parallel to the wheel axis. Actually, the bucket's inclination against the jet axis continually changes and the buckets so disposed as to make them move in a way nearest to the ideal motion above mentioned, at least during the most important part of the range of jet action will have the highest efficiency. From these considerations it may naturally be expected that case 2 will show the highest efficiency of the four experimented upon. The deviation of the bucket plane from the normal to the jet axis in the four cases are shown in Fig. 1, in which it will be observed that the deviation is least in case 2. The maximum deviation in this case is ± 8 deg.5 min., while it is + 22 deg. 14 min. in case 4. When the deviation is excessive as in the latter case, that is to say, when the bucket plane is much inclined toward the impinging jet, the deflected stream is forced downward considerably from the axial plane of the jet parallel to the wheel axis, which phenomenon was clearly observable during the tests through glass holes on the cover of the wheel; as a consequence of this, the torque exerted by the impinging jet is much reduced.

If the central ridge be not parallel to the plane containing the exit edges as in some buckets, it seems advisable so to fix the buckets that the jet shall be at right angles to the major axial plane, if it may be so called, of the double ellipsoid at the mean position of bucket between the beginning and end of the full jet. (*Memoirs of the College of Engineering, Kyushu Imperial University*, Fukuoka, vol. 2, no. 3, pp. 143–174, 16 figs., *e*)

INTERNAL-COMBUSTION ENGINEERING

NEW NELSECO DIESEL ENGINE. Details of a 600-b.hp. marine Diesel engine. In introducing the subject the author makes a significant statement to the effect that from his personal knowledge of the factories in this country and Europe there is no single European country whose compound Diesel and surface-ignition engine facilities can equal those of the eight leading factories of this country.

The New London Ship and Engine Company, the builders of the Nelseco engine, have in the past devoted their facilities principally to the construction of submarine-type engines for the United States and foreign navies, but expect now to give more attention to the commercial craft field.

The new engine weighs 53 tons overall, or 191 lb. per b.hp., and is chiefly designed for use in direct drive on small commercial vessels, such as ferries, tugs, etc. For large freighters, passenger vessels and tankers it may be used in conjunction with electric transmission, several engines being employed when necessary.

As regards the technical features, it may be mentioned that the six working cylinders for the engine are in line with the single three-stage air compressor at the forward end. In this air compressor the piston is driven from the crankshaft by means of a connecting rod and crosshead. Because of this the compressor cylinders are made entirely separate from the crankcase, which provides an accessible machine and avoids all trouble due to lubricating oil in the cylinders.

Independently driven circulating-water and lubricating-oil pumps are provided, but direct-connected pumps may be fitted at the forward end if desired.

For the lubricating of the engine, the system can best be described by calling it a gravity forced feed. With this system the lubricating oil flows from the gravity tank which is at a sufficient height above the engine crankshaft to give the proper pressure to the main bearings, then through holes in the crankshaft to the crankpins, and up the inside of the connecting rods to the wristpins. The crankcase is enclosed and all surplus oil drains to a suitably formed trough in the bottom of the bedplate, whence it is pumped back through suitable strainers to the gravity tank. All of the important bearings are thus under forced lubrication and a free flow of oil is circulating through them at all times. The camshaft parts are oiled by splash from oil carried in the bottom of the trough of the camshaft casings. All cylinders and exhaust-valve stems are taken care of by mechanical oilers, and the minor valve-gear bearings are fitted with oil cups for hand oiling. (*The Motorship*, vol. 6, no. 10, Oct. 1921, pp. 798–801, illustrated, *d*)

THE OPEN-FRONTED SURFACE-IGNITION ENGINE, F. G. Butt-Gow. General discussion of design of semi-Diesel engines, with particular attention to the differences between the closed type and the open for marine service.

The author compares the two types in detail from the point of view of manufacture and operation and shows that on the whole the crankcase is rather easier to build in the open type than in the

closed type. The cylinders of the two types are not very different, though possibly in the closed engines they may be slightly longer. The piston on the open engine may be made shorter as it does not have to perform the duties of a slide in the cylinder walls which serve as guides. The general conclusion to which the author arrives is that the cost of manufacture of the open engine should not be very much more than that of the closed engine, and in the larger sizes, that is, 60 to 100 b.hp. per cylinder, it ought to be less, owing to the use of smaller castings and subdivision of parts. This is especially so in view of the difference of lubrication.

On the closed engine the same system of forced lubrication is generally used. The crankpin brasses are usually supplied with oil by means of banjo rings or centrifugal lubrication. In the open-fronted engine the lubrication is practically the same as on a marine steam engine; either an ordinary open-drip system may be fitted or a drip with side feeds.

As regards operation, it is claimed that the closed engine shows more wear in the cylinder and bearings, the former being ascribed by the author to the use of a trunk piston. In the open engine the main bearings, top and bottom ends and guides, are in full view all the time, while in the closed engine the main bearings only are in sight. There is really no way to judge reliably of the extent to which the crankpin brasses are supplied with oil.

The following data as to lubricating-oil consumption are cited by the author:

Bolnes 130 b.hp., 0.005 pint per b.hp. per hr.

Closed type 160 b.hp., 0.010 pint per b.hp. per hr.

The question of adjustments is next discussed and the author shows that gudgeon-pin and crankpin adjustments are very much simpler and easier on the open-type than on the closed-type engine.

Various types of open crankcase engines are described and illustrated—namely, the Reliable, the Bolnes, the Grei, Lambert and Adie, Stallard double-acting hot-bulb engine and the Summer. Of these, the Lambert and Adie is of interest as it was first designed to work on the Brons (known in America as the Hvid) system of ignition, but can be adapted to surface ignition. (*Transactions of the Institute of Marine Engineers*, vol. 33, September, 1921, original paper pp. 239–269, 21 figs., and discussion pp. 270–278, *c.A.*)

Supercharging Engines and Their Uses

SUPERCHARGING ENGINES, G. H. T. Alston. General discussion of the subject, of which the part abstracted here deals with the application of supercharging engines for various purposes.

In particular, in considering the application of supercharging to road motor vehicles, the author calls attention to the fact that much would depend upon the method employed. If the supercharging were to be in action all the time, the effect would be equivalent to fitting a larger engine, or, conversely, an engine of smaller cubic capacity could be used and the same power maintained.

Supercharging can be applied also so that the capacity of the engine be such that the power developed at nearly full throttle but without supercharging would be that required during the greater part of the time, supercharging being only resorted to when greater than average power was required. Such an engine would be more economical as regards fuel consumption than one running normally under reduced throttle conditions.

There is therefore every reason to believe that supercharging, so applied, would lead to a large reduction in fuel costs per ton-mile on give-and-take routes. In order, however, to reap the maximum advantage from supercharging, it would be necessary to utilize to the fullest extent the accelerative powers possessed by such an engine. In such an application of supercharging it should be possible, without demanding any additional attention from the driver, to so control the engine (possibly by means of a permanent restriction in the induction pipe leading to the supercharging device) that only at slow speeds, on any gear, full supercharge is available at full throttle opening. As the speed increases, the restriction begins to take effect so that the supply of mixture is reduced.

By some such means it would be impossible to obtain full supercharge at any except reduced speeds, thereby avoiding seriously overloading the engine. A supercharge valve, under control of a governor, could operate in the same way, but it might, perhaps, be rather more easily put out of order. In Fig. 2 is illustrated an estimated power curve showing the effect of operating under these conditions compared with a power curve from a normal type of engine of slightly larger capacity but developing the same maximum brake horsepower.

It will be seen from these curves that the same maximum brake

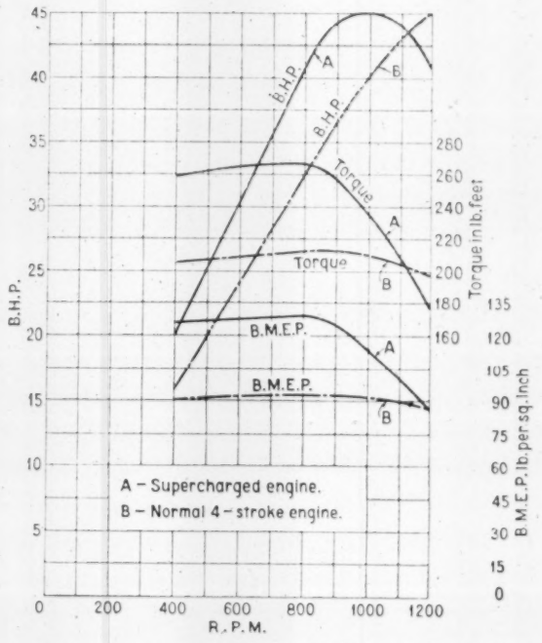

FIG. 2 POWER CURVES OF NORMAL AND SUPERCHARGED ENGINES

horsepower is available from each type of engine, but it is obtained from the supercharging engine at a much reduced speed, and that from this speed upward revolutions per minute are gained at the expense of the brake mean effective pressure, and that the brake horsepower therefore remains practically constant over a fairly wide speed range.

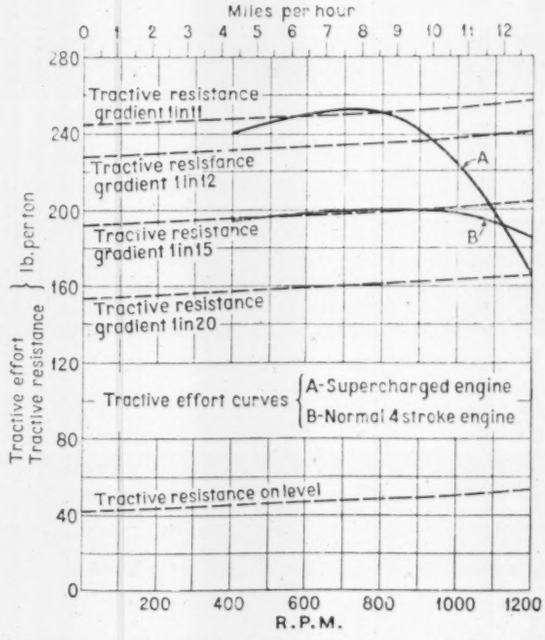

FIG. 3 TRACTIVE-EFFORT CURVES OF NORMAL AND SUPERCHARGED ENGINES

The aim has been, not to develop a maximum horsepower at maximum supercharge and revolutions per minute, but at a lower speed, so that the maximum brake horsepower is maintained over a considerable speed range by, as indicated above, exchanging brake mean effective pressure for revolutions per minute. In Fig. 3 are shown the tractive-effort curves for two different heavy-type

vehicles, the two vehicles being of the same gross weight. One is fitted with a supercharging engine capable of giving a power curve as (*a*) Fig. 2, while in the other is installed a normal four-cycle engine whose power curve is as (*b*). Road-resistance curves are both level and certain gradients are also shown, from which it is apparent that an engine with a power curve such as (*a*) would have a greater capacity for top-gear work.

These curves also show that the supercharging engine could still propel its load at a speed of 8½ m.p.h. on a gradient of 1 in 11, and at 10 m.p.h. on a gradient of 1 in 12, whereas with the normal four-cycle engine of the same maximum horsepower the speed would be reduced to 10 m.p.h. on a gradient of 1 in 15, and would then probably require a change of gear. Since hills of 1 in 12 and steeper are the exception on the main roads, it is safe to assume that the supercharging engine would be able to maintain its normal speed of 12 m.p.h. on top gear except when compelled to slow down for considerations other than gradients.

In a commercial vehicle of the passenger bus type, which is constantly stopping and restarting, speed of acceleration is of great importance, tending to considerably increase the mean speed of the vehicle without any increase of the maximum speed. Increased acceleration, if common to all vehicles, would speed up the traffic rate of the streets generally, and thus increase their carrying capacity.

The fact alone that gear changing was the exception and not the rule, as at present, would, in itself, tend to an improved service due to less fatigue to the driver, and would, in fact, largely reproduce with internal-combustion engines the almost ideal conditions obtained in this connection with steam.

If the foregoing be true with reference to road transport it is certainly also true with regard to transport on rail, such as yard shunting locomotives, etc. Such engines are, of course, almost continually employed starting up heavy loads from rest, so that the benefits derived from a large starting torque should be felt in a peculiar degree.

On the whole, the writer shows that for certain work the supercharging engine may possess three advantages: namely, lower fuel consumption under working conditions; greater torque at starting and at reduced speed; and greater horsepower for its cubic capacity, of which the last is hardly worth while with the exception of the semi-Diesel type of engine. (*The Automobile Engineer*, vol. 11, no. 155, Oct. 1921, pp. 337–341, 2 figs., *gtA*)

MACHINE DESIGN AND PARTS

RIVETED JOINTS. Butt joints usually carry two rows of rivets, but a joint devised in England (Fig. 4), in particular for joining

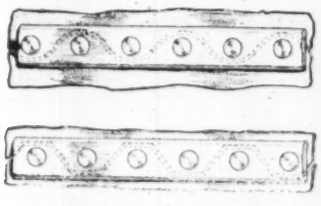

FIG. 4 BUTT JOINT WITH A SINGLE ROW OF RIVETS

panels of motor bodies, is of the butt type but so arranged that only a single row of rivets is required for it.

This result is obtained by scalloping the abutting edges of the plates so that the projection thus formed upon the one plate can be located in the corresponding notches formed on the other plate.

The rivets are therefore in a straight line and adjacent rivets lie alternately in each plate, being located in their respective projecting parts. Various forms of scalloping may be adopted, two kinds being shown in the illustration. (*Motor Transport*, vol. 33, no. 865, Sept. 26, 1921, p. 345, 1 fig., *d*)

MARINE ENGINEERING (See also Measuring Instruments)

ABANDONMENT OF TURBINE ELECTRIC DRIVE BY A SWEDISH COMPANY. It is stated that the Ljungstrom Steam Turbine Co., one of the first turbine manufacturers in Scandinavia who used electric transmission, has recently abandoned the electric drive and installed mechanical friction clutches with friction disks for reversing and power transmission. (*Motorship*, vol. 6, no. 10, Oct. 1921, p. 819, *g*)

MEASURING INSTRUMENTS

THRUST METERS IN MARINE WORK. General discussion of the subject of thrust meters and the results which may be obtained thereby, based on tests on the British destroyer *Mackay* and the U. S. destroyer *Pruitt*.

In both cases the operation of the meters enabled a measurement of thrust over a range of speed to be obtained, which, by its ease of application and reliability of results, offers a method of solution of many problems connected with both resistance and propulsion which for lack of such apparatus have hitherto defied precise analysis.

The two performances essentially corroborate one another to a very marked extent. Among other things, thrust meters show precisely what the propeller is doing (whether cavitation is present or not), and by deduction from the effective horsepower of the model permit assessing the uncertain influences of air or appendage resistance.

When cavitation is present accurate calculation of the thrust horsepower delivered by the screws becomes very difficult. The use of the thrust meter largely discounts this uncertainty of results. As an instance may be cited the fact that the measured thrust per square inch of projected area of screws ran up to 15.7 lb. in the case of the *Pruitt* and to just 15.0 lb. in the *Mackay*, but though the *Mackay's* propellers were obviously breaking down, the *Pruitt's* were still continuing work with high efficiency. Calculated from the effective horsepower of the model with appendages the respective pressures were 14.8 lb. and 12.5 lb., which is but a small instance of the light shed on some unsolved propeller problems by this measurement.

Thrust measurements will not solve the problem of the propeller efficiency of the ship, but they remove a most important element of doubt regarding its performance. The determination of the wake factor in the ship as distinct from the amount found by experiment in the tank, is essential before the real slip, and hence the efficiency, can be accurately estimated. This can be best done when the true thrust is known.

But it is mainly in the facilities which it affords for the comparison of experimental data with observations in practice that the value of the thrust meter will be found. It possesses the paramount advantage of giving the actual resistance of the whole ship under any condition or combination of conditions of loading, trim, weather, state of sea, depth of water, or condition of bottom; quite apart from the comparative data to be gained regarding the differences between trial and service performance, such matters as astern performance or maneuvering data (one engine ahead and the other astern) can be elucidated, while the use of actual screws to corroborate model results for purposes of design can now be placed on a very definite footing. In these items there is scope for a deal of research and profitable development of knowledge. (*The Engineer*, vol. 132, no. 3432, Oct. 7, 1921, pp. 375–376, (editorial), *g*)

MOTOR-CAR ENGINEERING

Unconventional Italian Tractor

THE AGROPHILE TRACTOR. Description of a new type of Italian tractor (the Pavesi) of unconventional design.

It consists of two separate carriages whose wheels are controlled and united or separated as required. Each carriage consists of a frame ending on one side in an arched rod shaped like a convex arc and fitted on the under part with a rack. The engine (horizontal, opposed, two-cylinder), steering gear and gear box are in the forecarriage, while the differential is in the second carriage.

To assemble the two carriages they are joined by the arched parts, which thus have a similar function to that of the buffers on tramway trailers, and they are fixed by means of a jointed cardan tie rod on the two axles. This tie rod carries, at its center,

a loose pulley which engages with the two racks placed below the curved members. Another shaft with a double cardan goes from the gear box of the main carriage and controls the differential of the second carriage. The four wheels are all driving as well as steering wheels, or, more accurately speaking, two axles steer. In fact, if the driver moves the steering wheel, the axle E of the main carriage AV (Fig. 5) turns obliquely, e.g., to the left of E_1, which moves the curved members to the right. The rack c carries the loose pinion p of the tie rod T, but this, on turning, forces the rack c' and the curved member of the second carriage AR to move to the right, and, consequently, forces the axle E' of that carriage to move to the right and take up the position E'_1. The two axles are then in such a position that a very short radius is required for turning the tractor. In fact, the external turning radius is 3.25 m.

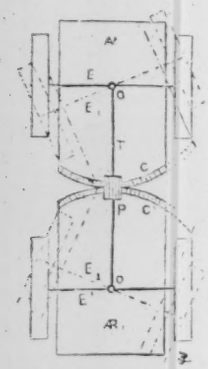

Fig. 5 Agrophile Pavesi Tractor

When it is observed that the articulations o and o' of the tie rod T on the two axles are cardans, it will be seen that the two carriages can take up any position in a transverse direction compared with each other. Thus the tractor can travel on the most uneven ground, as its two driving axles allow it to overcome obstacles more easily in spite of an average power and relatively light weight (2350 kg.). The usual compensation for complicated transmissions requires total adherence, and the complication is partly avoided in this case by the use of driving and steering axles instead of driving and steering wheels.

For light work, the driving carriage can be used alone by attaching it to a cart as a forecarriage; but with both carriages the high tractive effort obtained is sufficient to tow several vehicles (*The Practical Engineer*, vol. 64, no. 1806, October 6, 1921, p. 218, 1 fig., *d*)

POWER-PLANT ENGINEERING (See also Special Processes)

High Steam-Pressure Economies

Economy of Steam Engines, Frederick Samuelson. Discussion of high steam pressure and other means of increasing economy of steam engines.

In all heat engines the theoretical efficiency depends upon the limiting temperatures between which the plant works. In steam engines the lower limit of temperature is determined by the condenser, and to obtain a higher efficiency it is necessary to raise the upper limit of temperature, either by superheating the steam, or raising its pressure, or both.

The ideal efficiencies obtainable, that is, the values of the ratio: (heat available in steam)/(total heat in steam), corresponding to various pressures and temperatures in the simple steam turbine, are shown in Fig. 6. As the highest safe working temperature when ordinary materials of construction are used is about 800 deg. fahr., higher efficiencies can only be obtained by increasing the pressure.

The steam consumptions of a larger turbo-generator set under various conditions are shown in a table. The figures do not include auxiliaries, and assume a boiler efficiency of 100 per cent. With 350 lb. pressure, 300 deg. fahr. superheat, 29 in. vacuum, and cold feed, the consumption is 9.60 lb., and the efficiency 26.38 per cent. With feedwater raised to 300 deg. fahr. by steam extracted from the turbine, other conditions remaining as before, the steam consumption increases to 10.72 lb.; but the overall efficiency is raised to 28.44, or an improvement of over 7.5 per cent.

When evaporators are necessary, they should be heated by steam abstracted from the turbine, and the water evaporated should be condensed in the feedwater. With feedwater at 300 deg. fahr. stack losses should be kept down by inserting an air heater after the usual economizer.

A 1500-kw. plant constructed by the author's firm (British Thomson-Houston Co.) and supplied with steam at 350 lb. superheated to a total temperature of 700 deg. fahr., has been in use since 1914. It has proved very successful, and the expected saving in coal of 15 to 18 per cent has been more than realized. Larger sets of from 5000 to 15,000 kw., to work under similar steam conditions, are now being supplied. (*Proceedings of the Institution of Mechanical Engineers*, no. 6, Oct. 1921, pp. 601–604 and discussion pp. 604–606, 2 figs., in original article, *gp*)

Steam-Condenser Design and Construction

The Modern Steam Condenser, E. R. Briggs. A general discussion of condensers with particular regard to the practice of a certain British manufacturing company. Only certain parts are abstracted here.

The author is not in favor of the so-called "boat-shaped" condenser, claiming that it is unsatisfactory in that it requires internal stays which interfere with the flow of the steam, and is moreover expensive to construct.

As regards the method of withdrawing the air from the condenser without permitting air pockets, the article describes and illustrates an arrangement where the air branch is taken from the side of the condenser and communicates with the space inside the plate that extends the whole length of the body. As regards the permissible amount of air in a condenser, it is stated that from 3 to 6 lb. of air per 10,000 lb. of steam is allowed, the higher figure for 3000-kw. sets and the smaller figure for 20,000-kw. sets. The method of basing the air allowance on the quantity of the steam is very unsatisfactory, because only a very small amount of the air to be dealt with comes over with the steam itself, the bulk

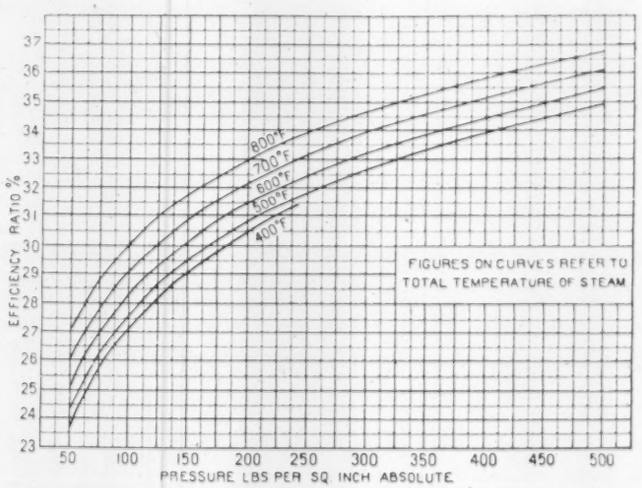

Fig. 6 Efficiencies in Steam Turbines at Various Steam Pressures

of it entering through the turbine glands and the joints in the exhaust piece and condenser. An excess of air can usually be detected by noting the difference between the temperature of the condensate in the bottom of the condenser and the actual vacuum, the original article giving the complete calculations necessary.

In Great Britain the transportation factor enters into the design of a condenser to a very serious extent, because of the limitations of the British loading gage. Generally speaking, condensers up to 8 ft. internal diameter can be fitted with tips at the maker's works and so delivered to site. Above 9 ft. diameter it is seldom possible to deliver the shell in one piece. Up to 11.5 ft. the shell can be made in rings, but above 11.5 ft. the body and water boxes must be divided into segments, which means, as a matter of fact that the segmental type must be used for practically all units in excess of 20,000 kw.

A typical British condenser design is described and illustrated in the original article. The tubes are of Admiralty mixture, $^3/_4$-in. O.D. by 18 gage. In some of the condensers, instead of following the usual practice in the arrangement of the inlet and outlet water boxes, the arrangement shown in Fig. 7 was employed. This arrangement permits of easy stream-line flow of the water from the pipe line (40 in. diameter) into the tubes and from the tubes to the return pipe. The frictional resistance required to get the water into and out of the condenser is reduced, which means

a saving in the power required to drive the circulating pumps. (*English Electric Journal*, vol. 1, no. 6, April 1921, pp. 244–253, 9 figs., *d*)

RAILROAD ENGINEERING (See also Transportation)

FEEDWATER HEATING ON THE LONDON AND NORTHWESTERN RAILWAY. Details of the latest application of the Weir feedwater heating system and pump to a George V.-class express locomotive. This arrangement is different in some respects from that previously used. Thus, the pump is placed alongside the front of the smokebox on the left-hand side of the engine, and a top feed device is used mounted on the boiler barrel between the steam dome and the safety valves. The feed device consists of a spray delivery valve through which the hot water passes into the boiler.

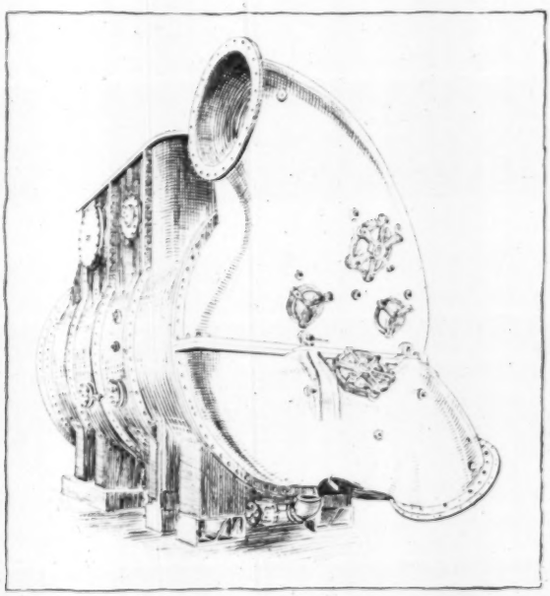

FIG. 7 END VIEW OF A BRITISH-BUILT CONDENSER, SHOWING INLET AND OUTLET WATER BOXES

The pump is of the vertical double-acting type essentially similar to the Weir marine boiler feed pump. Its principal feature is the method of distributing steam to the cylinder whereby the pump will work well at all speeds from as slow as one stroke in 5 min. up to about 30 double strokes.

G. and J. Weir, Ltd., the makers of this device, are the strongest advocates of direct-contact feed heating for marine work, but adhere to the surface type in their locomotive work.

This is due to the belief that the direct-contact heater is inherently weak, owing to the complication of the feeding agents, and would have to be too large to fit on a locomotive or its necessary feeding agents too small for their work. Because of this a heater is used of the surface type, consisting of a cast-iron shell with end doors and a tube element made up of straight, solid, drawn copper tubes expanded into headers, one of which forms the end cover of the shell while the other is free to move within the shell due to the expansion or contraction of the tubes.

In the heater installed on the locomotive described here, the water traverses the element 12 times by means of two tubes each flow, the headers being divided into compartments. The provision of these divisions within one casting eliminates the objectionable necessity of having joints under high pressure. (*The Railway Gazette*, vol. 35, no. 16, Oct. 14, 1921, pp. 572–574, 2 figs., *d*)

REFRIGERATING ENGINEERING

High-Speed Ammonia Compressor

HIGH-SPEED AMMONIA COMPRESSOR. Description of a compressor of British manufacture having a normal running speed of 350 r.p.m. and cylinders with an internal diameter of 9 in. and piston stroke of 9 in.

These compressors have a refrigerating capacity of 100 tons a day and an ice-making capacity of 60 tons a day of 24 hours. It is of interest to note that the definition of capacity adopted by the British manufacturers is the standard definition of the American Society of Refrigerating Engineers (December, 1920) which, it is said, will probably be adopted universally in England in the near future.

The advantages from the employment of the high-speed compressors are reduction in weight, space occupied, and first cost. In this case the actual floor space required by the steam-driven plant is 85 sq. ft., whereas that for a horizontal slow-speed compressor of similar capacity driven from the tail rod of a steam engine would be about 385 sq. ft. The weight of the compressor and the bed plate alone is 7½ tons, or about one-third of the weight of a slow-speed horizontal machine of equal capacity.

The compressor is of the four-cylinder vertical single-acting type with a totally enclosed crankcase and forced lubrication. The crankcase is of the dry type, the used oil passing through an opening into a large tube situated between the crankcase and bedplate. From this tube it is drawn through a strainer by means of a gear-type rotary pump and delivered through jets to the main bearings and stuffing boxes. Other jets in the delivery pipe supply oil to the big ends, gudgeon pins and cylinder walls.

The cylinders and pistons are all of the same construction, a fact which together with the sectional construction of the crankcase considerably reduces the time and cost of manufacture. Also machines of different capacity can be made up by merely employing a larger or smaller number of cylinders.

The upper portion of the cylinder is bored to a larger diameter than the working portion, and in it fits a movable head which is held in position by three strong helical springs in compression. The lower ends of these springs fit into recesses in the head, and their upper ends are pressed downward by a cast-iron dished cover secured to the cylinder casting by means of studs. It will be readily understood that this arrangement constitutes a safety device, which serves to relieve excess of pressure arising from any accidental cause, and also to prevent any serious damage from occurring in the event of a solid foreign body getting into the cylinder. The head itself, which is shown to a larger scale in Fig. 8 is composed of two steel forgings, of which the lower one forms the seat for the delivery valves. The lower part, it will be seen, is formed with a screwed shank, and a nut on this clamps the two parts together. Two annular valves, made of a specially hard and tough steel alloy, are provided, and these valves, which are formed with lips on their working faces, cover the delivery ports in the lower portion of the cylinder head. The valves are prevented from moving laterally by three resilient stops, one of which is shown in section on the left of Fig. 8, and their vertical lift is controlled by light steel springs surrounding the stops, as will be clear from the illustration. The necessary lift for normal working conditions is of the order of 1/16 in., and vertical movement in excess of this amount is limited to the resilient stops. The compressed gas passes through the annular delivery passage to a pipe connection and it should, perhaps, be explained that the smaller annular groove above the delivery passage is provided merely to reduce the thickness of the metal at this part; it has no connection with the working of the compressor.

The inlet arrangement is one of the most interesting features of the design. Four annular inlet valves, of similar design and material to the delivery valves above described, are fitted, and their lift is restricted by spring-controlled bolts, as will be clear from Fig. 8. The heads of these bolts are formed with flanges which project over two valves, as shown, but parts of the flange are cut away, so that by pulling up the bolts against the action of the springs and turning them about their axes, the valves can be removed for examination without withdrawing the piston; snugs on the heads of the bolts prevent them from turning in their normal working positions. The opening and closing of the inlet valves is produced mainly as a result of inertia effects, as will be clear from the consideration of the motion of the piston. When the latter commences its down stroke, assuming for simplicity that the motion is simple harmonic, the downward acceleration will be a maximum, so that the valves will leave their seats and allow the gas to pass into the space above the piston. The ac-

celeration, of course, diminishes as the piston descends, becoming zero in the middle of the stroke and afterwards changing sign, so that the valves then tend to return to their seats. The difference in pressure is, however, sufficient to prevent them from doing so until the retardation reaches its maximum value at the end of the down stroke. On the up stroke the conditions are of course reversed, inertia effects at first assisting in keeping the valves closed and afterwards tending to open them, but before this latter stage has been reached, the gas pressure above the piston has risen sufficiently to counteract the effects of inertia.

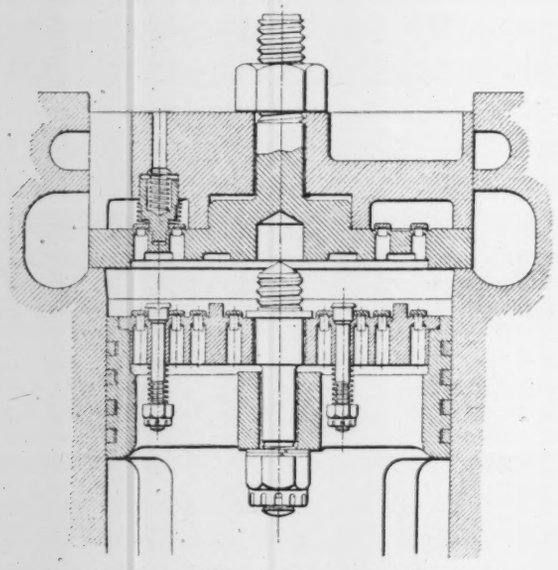

FIG. 8 HEAD OF HIGH-SPEED AMMONIA COMPRESSOR

From the foregoing descriptive matter it will be seen that the inlet and delivery arrangements of the machine are designed in accordance with the well-known uniflow principle, and it is perhaps hardly necessary to point out that the arrangement has similar thermodynamic advantages in the case of an ammonia compressor to those experienced in the working of a uniflow steam engine. The fact that the inlet and delivery passages are widely separated, greatly reduces the interchange of heat between the fluid and the metal, thereby diminishing the superheating of the incoming gas. The larger passages and valve openings, rendered possible by the annular valves, also have the effect of reducing wiredrawing, and these two features together materially increase the volumetric efficiency of the machine and the weight of gas pumped, in comparison with the older double-acting compressors having mushroom valves. The large valve openings, as already mentioned, are obtained with a very small lift, and this fact, in conjunction with the light weight of the valves, eliminates hammering and reduces wear to almost negligible proportions; the largest inlet valve in the compressor illustrated, we may add, weighs only 2½ oz. Another feature which should be mentioned in this connection, is that the inlet ports in the piston head are drilled obliquely with the axis, so that the gas flowing through them has a velocity component tangential to the valves. A slight rotary motion is thus imparted to the latter, which tends to dislodge any particles of grit present on the seating, and also to render the small amount of wear taking place quite uniform. (*Engineering*, vol. 112, no. 2910, Oct. 7, 1921, pp. 507–508 and 510, 9 figs., *dA*)

SPECIAL MACHINERY

THRUST-BORING MACHINES. Description of a new method and machinery for constructing underground public lines without disturbing the surface layer. This machine was used extensively during the war where pipes and cables had to be laid under roadway crossings and it was not possible to stop the traffic and dig a trench in the ordinary way. A similar purpose machine has also recently been used by the British Postoffice Department for thrusting nine 3½-in. steel pipes under the Channel Sea River at Stratford, London.

In this instance the Manganol-Irving thrust-boring machine was used, consisting of a hydraulic ram and various accessories. The ram consists of a steel cylinder and piston and the cylinder, which is approximately 5 ft. long, is fitted in a substantial iron crane and provided with means for rotation.

The apparatus works only on ground of a clay nature and the hardest blue London clay can be thrust-bored; it is not suitable, however, for chalk, sand, rock, etc. Holes from 2 to 12 in. diameter and in some cases even larger sizes can be made. (*The Postoffice Electrical Engineers' Journal*, vol. 14, no. 3, October 1921, pp. 181–188, 19 figs., *dA*)

Self-Contained Tunneling Machine

TUNNELING MACHINE. Description of a tunneling machine comprising a tunnel shield with a boring head and a rotating tail attachment, by means of which the lining is placed as the machine progresses.

One motor drives the boring head and the rotating helix. The head is movable, which makes it possible to change the direction or grade of the tunnel.

As the helix rotates it produces in the caterpillar tread an advancing gap for inserting the concrete lining blocks, one at each end around the bore. The blocks, which are of peculiar shape, are set in spiral courses, so that as the helix revolves it forces the shield ahead by screw action. The same thrusting action closes up the lining joints and expands the lining ring through the space occupied by the shell of the shield. Fig. 9 shows the machine in operation.

One of these machines is now operated in an experimental tunnel in Philadelphia, Pa. The tunnel is through schist and has a 5-ft. bore. (*Engineering News-Record*, vol. 87, no. 14, Oct. 6, 1921, pp. 555–556, 3 figs., *d*)

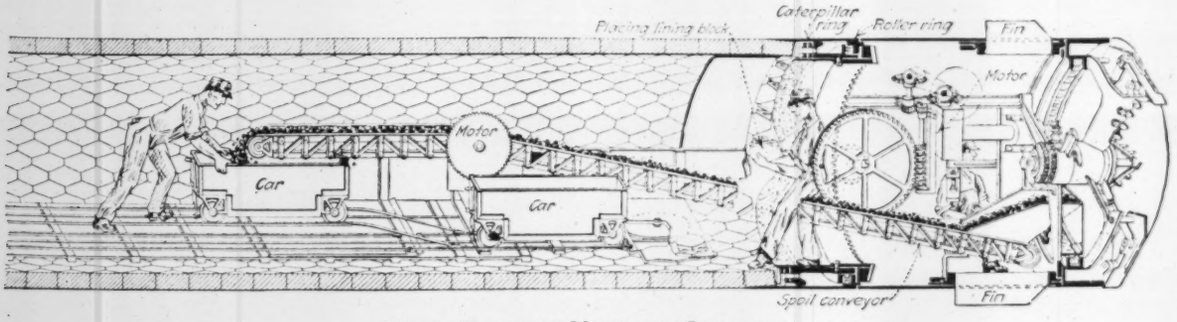

FIG. 9 TUNNELING MACHINE IN OPERATION

TEMPLE SUBMARINE STUD DRIVER. Description of a tool for use mainly in submarine salvage operations. The function of the tool is to fix studs into steelwork, such as ships' plates, under water, so that patching plates or attachments for lifting may be bolted on. The studs used at the demonstration given in September in London were of a tool steel tempered to a dark blue color, with one end bluntly pointed, after the manner of the old pattern of service projectile, and the other end having a screw thread cut on it.

The studs were about 3½ in. long and ⅝ in. in diameter. They were shot into a 9/16-in. steel plate from the muzzle of a "gun," held in contact with the plate and pierced the latter so that about an equal length of the stud was left projecting on both sides.

The metal of the plate was splashed up around the stud at entry and exit, the stud appearing quite uninjured. The operation of driving the stud was instantaneous and the noise hardly more than that of an air gun.

The Temple gun resembles a pneumatic hammer, but with the handle crosswise at the end like that of a spade. Pressure of the muzzle of the gun against the work causes the barrel to telescope slightly against the action of a spring, which causes a striking pin to detonate the cap and fire the explosive charge. The charge, which may consist of any ordinary propellant explosive, is contained in a cylindrical metal cup attached to the rear of the stud. (*Engineering*, vol. 112, no. 2909, Sept. 30, 1921, pp. 475, *d*)

SPECIAL PROCESSES (See also Fuels and Firing)

Hammer Welding

HAMMER-WELDING PLANT OF THE BLAW-KNOX CO., Ernest Edgar Thum. Description of the process used at the plant, of interest because of the fact that comparatively little information is available on hammer welding.

At the Blaw-Knox Co. tanks of various kinds are produced by this method, such as dephlegmators, stills for cracking gasoline, etc. In particular, the manufacture of a boiler shell, say, 8 ft. in diameter by 15 ft. long, is described. In the first place, a square plate of appropriate size is selected and the edges brushed vigorously with a wire brush to remove dirt or loose dust. The plate is then rolled into a cylindrical tube of correct diameter so that the edges overlap a distance about the thickness of the plate. As it is impossible to effect an exact closure of a long seam in the rolls, the plates are permitted to lap over each other in a blunt angle. Such a seam may often be welded immediately, especially if the bent plate is stiff enough so that there is little tendency for the two edges to spring apart when they are hammered. Shorter seams, heads and smaller fixtures are attached by screw clamps and "tacked" on with an oxy-acetylene flame, which means that the workman builds up short fillet welds at intervals of 3 or 4 ft.

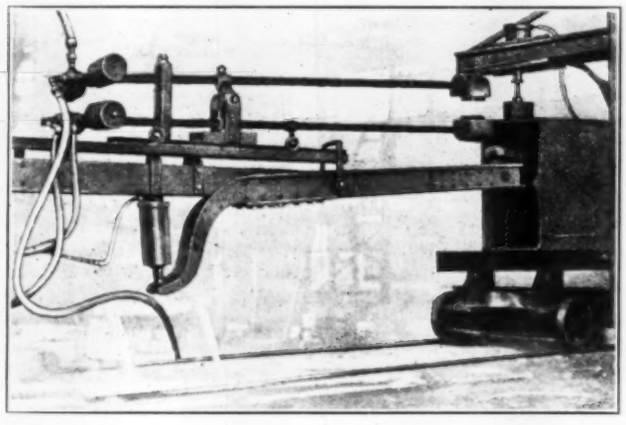

FIG. 10 BLAW-KNOX HEATING AND HAMMERING MACHINE FOR HAMMER WELDING

A heating and hammering machine which is brought to the work consists essentially of two pivoted hammers (Fig. 10) carrying burners, another with an anvil, and a fourth may carry the air hammer, which may, however, also be held by a jib crane.

About five minutes is required to reach a welding heat on a 12-in. seam in $^7/_8$-in. plate. Fine sand or borax may be used as a flux, but if the flame is held with the slight deficiency of air, little trouble from slag or oxide is to be expected in low-carbon metal. When the proper temperature has been reached the gas and air are turned off, the burners swung to one side and their places immediately taken by the anvil beneath and the hammer above.

First light blows of the hammer are directed at the corner of the sheet, gradually working across the weld, ejecting any molten material in a sheet of white-hot sparks. High-speed blows at full air pressure are continued until the temperature has fallen to a faint red, when the force of the blow is lightened, but continued down the recalescence temperature to a black heat. The hammer itself is swung so it is moved back and forth by the foreman during this operation; the pipe meanwhile resting solidly on the horn, inertia in the hammer cylinder and arm absorbing the reaction from the blow. Air at 100 lb. per sq. in. is the motive power; the cylinder is 5 in. in diameter, the stroke is 11 in.; and a blow is struck 160 times per minute.

About half the length heated is welded in this operation, but in thick plate the region must be reheated and hammered twice more before the combined sheets are worked down to the thickness of the rest of the shell. This produces a lap joint which is at least 3 in. long in any sheet thicker than $^3/_8$ in. Flux is more liberally used in the second and third heatings. When this spot is finally joined to the foreman's satisfaction, the carriage is shifted and the same cycle of operations repeated on the continuation of the seam.

After the completion of welding the cylinder is replaced in the bending rolls. They are adjusted to give the exact curvature required and the seam rolled back and forth several times to bring this portion to correct shape. Water gas is used as a fuel. Good facilities are available for testing the welds. Among them is a long testing press for proving open-ended pipe up to 6 ft. in diameter and 40 ft. long at any pressure under 1500 lb. per sq. in. After a pressure of 50 to 100 per cent in excess of the working load has been supplied, the seam is struck vigorously several times with a 10-lb. sledge. This not only lays bare many a defect which would not be detected by a static load, but actually subjects the whole structure to a considerable impact as is evident by the pressure gage jumping about 100 lb. at each blow. It is important to note that such testing should never strain the vessel much more than 80 per cent of the proportional limit of the material, as otherwise the metal will become somewhat brittle due to cold work. (*Chemical and Metallurgical Engineering*, vol. 25, no. 16, Oct. 19, 1921, pp. 747–751, 8 figs., *d*)

Oil Cooling

COOLING OIL FROM QUENCHING TANKS, S. E. Derby. An article dealing chiefly with cooling the oil used in quenching steel, but in some of its parts applicable also to the general problem of cooling oil, such as that coming from the bearings of machinery.

In particular reference to the question of steel treatment, it is noted that proper speed of cooling is a determining factor in the degree of hardness attained in the steel. The rate of cooling depends primarily upon the size of the piece of metal, but also upon the composition of steel and the rapidity with which the cooling or quenching medium removes the heat. This rapidity is determined by the nature of the medium, its fluidity, specific heat and temperature. Because of this, oil in quenching tanks must be maintained at a certain temperature suitable for each particular kind of operation, and this means that the oil must be recooled.

Modern practice favors recooling by circulating the oil in a closed circuit and recooling it in a separate cooler. The original article describes some typical oil coolers.

Data presented in the original article show that the quenching speed varies considerably with the oil used and initial temperature of the bath. Thus G. W. Pressell found the figures given in Table 1.

The variation in temperatures as apparent from Table 1 indicates the importance of the proper system of oil recooling.

TABLE 1 QUENCHING SPEEDS OF OILS AT DIFFERENT INITIAL TEMPERATURES

Kind of Oil	Variation of quenching-bath temperatures	Variation in time required for the steel to cool from 1200 to 600 deg. fahr.
Fish oil, lot no. 1	88 to 255	97 to 120
Fish oil, lot no. 2	71 to 251	78 to 93
Linseed oil	84 to 261	94 to 107
Cottonseed oil	100 to 230	104 to 119
Heavy viscous drawing oil	75 to 229	154 to 181
Houghton's no. 2 soluble quenching oil	82 to 249	97 to 102

Fig. 11 (page 820) shows the ratio of water to oil for a typical oil cooler and another figure in the original article gives the heat-transfer rate with viscosity corrections for an oil cooler.

The general practice is to specify one gallon of oil for every pound of steel quenched per hour, and the original article gives practical methods for determining the size of cooler necessary and the quantity of circulating water. (*Forging and Heat Treating*, vol. 7, no. 10, pp. 528–530, 6 figs., *dg*)

RECENT IMPROVEMENTS IN THE MANUFACTURE OF WELDED PIPE, F. N. Speller, Mem. Am.Soc.M.E. After a general statement of the history of the manufacture of butt-welded pipe beginning with the work James Russell in England in 1824 and carried down to the Spellerizing process of recent years, the author proceeds to the discussion of the most modern method of scale removal.

Mill scale on butt-welded steel piping is of a peculiar character. It consists essentially of iron oxides, principally Fe_3O_4, with 7 or 8 per cent of silica and smaller amounts of C_2O and Al_2O_3 from the furnace bottom. At the welding temperature this scale is fluid and forms a natural flux for welding, as well as a protection to the metal against excessive oxidation from the furnace gases, so that this is a very essential factor in the welding of pipe—so much so that pipe steel is made primarily so that it will be self-fluxing by readily forming this fluid oxide at as low a temperature as possible. Wrought iron carries considerable excess of fusible slag and oxides intermixed with the metal, whereas pipe steel when properly made readily forms a suitable fluxing scale when heated to the welding temperature. The melting of the welding scale affords the welder a sharp indication of the temperature of the skelp, which is much better than any pyrometer for this purpose. On cooling, the welding scale passes through a viscous stage and then quickly becomes brittle at a temperature at which the steel is still quite easy to forge. Most of the scale on the outside is removed in the sizing and straightening rolls, but inside the pipe scale is often $^1/_{32}$ or $^1/_{16}$ in. thick in patches, and when cold is firmly attached to the metal like an enamel. Several means have been used to remove this scale to prepare the pipe for galvanizing and other coating operations. Pickling in acid is the most common

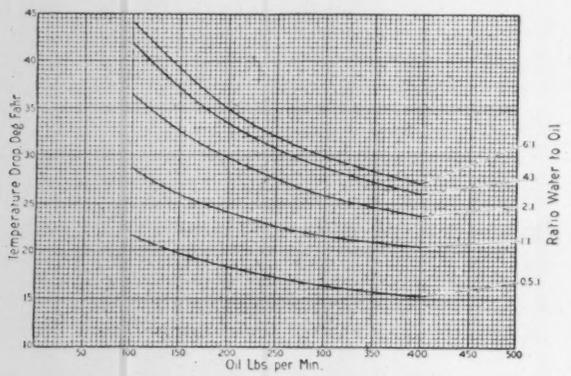

FIG. 11 WATER-TO-OIL RATIOS FOR A TYPICAL OIL COOLER

method employed but is the least effective on the inside of pipe where the scale is most firmly attached, and, further, as the scale is very irregular and rather thick in spots, portions of the metal are likely to be damaged by overpickling before all the metal is cleaned. Mechanical cleaning by sand blasting and cold rolling has been tried, but has not been thorough enough, besides being quite costly.

By making the diameter of the pipe larger and then reducing the size and elongating the pipe at the highest temperature at which the scale is brittle enough to remove, it has been found possible to clean the pipe in the process of hot finishing and at the same time produce a better material in other respects. This new process of finishing is very advantageous. It will be seen that two additional steps are introduced in the finishing operation in order to produce what is practically a scale-free pipe: (1) a partial cooling from about 2500 deg. to 1800 deg. fahr.; and (2) a reduction in diameter and elongation of about 10 per cent in length by means of a series of horizontal and vertical rolls, by which the brittle scale is cracked and separated from the steel. The pipe is then straightened and cooled as usual, during which a thin film of new oxide forms sufficient to protect the metal from rusting while being handled. A thin coating of suitable lacquer is now applied, which affords substantial protection to the pipe in storage. The main object of these scale-removing and cleaning operations is to make possible more uniform galvanizing. This also has an important bearing on the manufacture of all kinds of coated pipe and conduit for electrical purposes. (*The Blast Furnace and Steel Plant*, vol. 9, no. 10, October 1921, pp. 580–582, *d*.

In connection with this article attention is called to a paper by the same author on Control of Corrosion in Iron and Steel Pipe, published in MECHANICAL ENGINEERING, Oct. 1921, p. 661 et seq.)

THERMODYNAMICS

A NEW THERMAL TESTING PLATE FOR CONDUCTION AND SURFACE TRANSMISSION, F. C. Houghton and A. J. Wood, Mem. Am.Soc. M.E. Summary of an investigation conducted jointly by the Engineering Experiment Station of the Pennsylvania State College and the Research Laboratory of the American Society of Heating and Ventilating Engineers at the thermal testing plant of the Pennsylvania State College.

Essentially the heating plate is similar to that used by the U. S. Bureau of Standards, with the difference, however, that in the plate employed at the Pennsylvania State College one side of the blank is exposed to the air in a cold room which is kept at a uniform temperature. This makes the plate method adaptable only when the room temperature can be controlled, but it permits determining at the same time both conductivity and surface transmission constants.

The plate is heated by an electric heating element, while the cold room is maintained at the proper temperature by brine circulation. The original article gives the methods of calculations and results of tests with temperature differences ranging from 52.4 to 71.5 deg. fahr., as well as the errors occurring in these measurements. (*Journal of the American Society of Heating and Ventilating Engineers*, vol. 27, no. 5, July 1921, pp. 529–542, 12 figs., *e*; also *Journal of the American Society of Refrigerating Engineers*, vol. 8, no. 1, July 1921, pp. 23–36, 12 figs., *e*)

TRANSPORTATION

PIPE-LINE TRANSPORTATION FOR ANTHRACITE AND BITUMINOUS COAL, Geo. A. Orrok and W. S. Morrison, Members Am.Soc.M.E. Discussion of a plan of pumping coal from the coal fields to New York, with data as to the cost of plant and operating costs.

The idea is not new and has been under consideration since the early nineties. Transportation of material in a more or less finely divided state by a stream of water has long been known and practiced, and, among other things, is the method used in handling the vast deposits of phosphate rock in Florida located mostly under water.

It is proposed to have from place to place relay stations with four separate single-stage pumping units at each. The units are to be direct-connected, each to its own motor and arranged to operate in pairs in series with each other, with the discharge from the first pump taking its supply from the supply connected to the suction of the second and the discharge from the second delivering into the line main.

Three routes have been tentatively laid out: one from Scranton to Piermont on the Hudson, 130 miles; (2) from Scranton to Newark Meadows, 195 miles; (3) from Clearfield to Piermont, via Scranton, 322 miles.

The estimated cost of the plant varies from $12,100,000 for Route 1 to $31,830,000 for Route 3. The fixed charges and operating expenses together vary per ton from 62.8 cents for Route 1 to $1.47 for Route 3.

A 14-in. pipe line can handle an average of 6,000,000 tons of coal per year and three such lines would probably provide for the entire New York supply of both anthracite and bituminous coal.

In this estimate the cost of the necessary water is not included, though in some cases it might become an important item. It is not believed that there will be any material trouble in the corrosion of pipes resulting from sulphur content in the coal. (Address before the Association of Edison Illuminating Companies, Spring Lake, N. J., Sept. 12, 1921, abstracted through *Power*, vol. 54, no. 18, Nov. 1, 1921, pp. 699–700, *d*. Attention is also called to a brief editorial in the same issue of *Power* on p. 688.)

WOODWORKING MACHINERY

Machine for Railway Tie Making

CROSS-CUTTING, ADZING AND BORING MACHINE FOR RAILWAY TIES. Description of a machine built by a British concern for

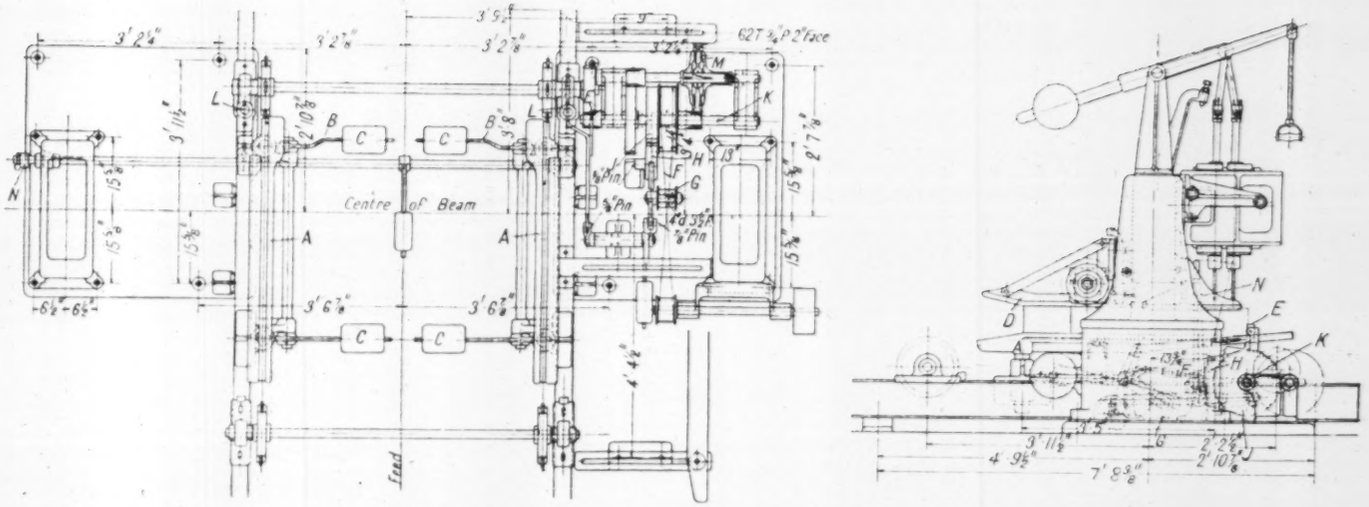

FIG. 12 SLEEPER CUTTING, ADZING AND BORING MACHINE

the Indian State Railways designed for cross-cutting and boring ties up to 10 ft. long, 10 in. wide and 6 in. deep; it will also adz rail seatings up to 10 in. wide and 16 in. long. This machine is shown diagrammatically in Fig. 12, and the original article contains also two halftone views.

An interesting feature of the machine is the method employed to drive the boring spindles. For this purpose a series of four endless roller chains running in horizontal path are provided, each chain driving two spindles. The chains are of Renold's bush roller pattern. The gear box contains a pair of miter wheels running in an oil bath, the horizontal shaft being fitted with an outside driving pulley to receive motion by belt from the overhead countershaft. This type of drive was found convenient where universal adjustments of the spindles are necessary. (*The Engineer*, vol. 143, no. 3431, Sept. 30, 1921, pp. 348, 353–354, 3 figs., *d*)

CLASSIFICATION OF ARTICLES

Articles appearing in the Survey are classified as *c* comparative; *d* descriptive; *e* experimental; *g* general; *h* historical; *m* mathematical; *p* practical; *s* statistical; *t* theoretical. Articles of especial merit are rated *A* by the reviewer. Opinions expressed are those of the reviewer, not of the Society.

New Bolinder Engine

A notable improvement on the Bolinder semi-Diesel engine has been perfected, and one of these new engines fitted into a tugboat on the Thames, the boat being the largest motor tug in Great Britain. The improvement is in the ignition device and the fuel-injection apparatus. The new fuel injector, the use of compressed air for keeping the ignition bulb cool has been eliminated, the use of water for the same purpose having been discarded for some time. The new device consists essentially of a housing, injection nozzle, and a spindle, which is capable of adjustment from the starting platform. The device is fitted on top of the bulb, and it is possible to run the engine at full load with the ignition bulk so cool that it remains black. It is also possible to run the engine at light load indefinitely, the bulbs retaining sufficient heat for ignition. The ignition device, which is electrical, is mounted in a water-cooled housing, and by means of a sleeve can be projected into the ignition bulb or withdrawn as required. When it is withdrawn a valve on the sleeve seals the chamber containing the igniter, thus protecting it from the heat of combustion, and when it is pushed forward in the chamber for starting purposes, a valve on the other end of the sleeve closes the water-cooled housing. With this device starting from cold can be accomplished immediately, without the use of any lamps for warming the bulb. The makers claim that with the new fuel injection device the power is increased by 20 per cent. The new model is known as the N.E., and has been fitted in several vessels besides the one mentioned here. (*Marine Engineering of Canada*, vol. 11, no. 10, Oct. 1921, p. 21)

CODE ON DEFINITIONS AND VALUES

(*Continued from page 810*)

151 *Heat Input for Otto and Brayton Cycles* is expressed as

$$\text{B.t.u. per i.hp-hr. or b.hp-hr.} = \frac{2545}{E_o}$$

$$\text{B.t.u. per net kw-hr.} = \frac{3413}{E_o}$$

152 *Water Rate* of an engine, turbine, or complete steam plant is the pounds of steam at actual condition, per unit of output; it is to be corrected neither for moisture nor superheat.

153 *The Quality of Steam* or other vapor is specified in two ways: If the vapor is superheated, the quality is described by stating the number of degrees of superheat. If the vapor is wet, the quality is described by stating the dryness factor; for example, if steam contains 2½ per cent of moisture, its dryness is 0.975.

Dry Steam, to which most steam conditions involving wet steam were formerly corrected, is that condition at which there is present no moisture and no superheat, and the heat content is that of the point of saturation. It is a condition which cannot be exactly realized commercially, and as the correction to dry steam has never been applied to superheated steam, it appears advisable to discontinue its use. This does not bar its employment, as a condition, together with a definite pressure (and back pressure or vacuum), for correcting guarantee tests to a common state.

154 *Fuel Rate*, for solid and liquid fuels, is defined as the pounds of fuel as fired, per unit of output per hour. For gaseous fuels it is defined as cubic feet of gas at 68 deg. fahr. and one atmosphere, per unit of output per hour. It should be qualified by reference to the unit of output.

155 *Drawbar Horsepower* is the product of the dynamometer pull in pounds at the drawbar, on level track, and the speed in feet per minute, divided by 33,000.

156 *One Ton-Mile* is defined as one short ton transported a horizontal distance of one mile; it is not a work unit. Similarly, one train-mile is defined as a complete train transported horizontally one mile. Both of these units are used in general data on performance in the Locomotive Code.

157 *Heat-Transmission Coefficient* is defined as the British thermal units transmitted per square foot of heating surface per degree mean temperature difference per hour.

158 *Cooling-Tower Efficiency* is expressed by the formula—

$$\text{Efficiency} = \frac{t_1 - t_2}{t_1 - t_w}$$

where t_1 = temperature of water before cooling
t_2 = temperature of water after cooling
t_w = temperature of wet bulb.

ENGINEERING RESEARCH

A Department Conducted by the Research Committee of the A.S.M.E.

Research Theses

THE Research Committee has received from Prof. W. R. Eckart of Stanford University the following suggestions and would like to receive the opinion of those using this section of MECHANICAL ENGINEERING regarding the advisability of following them. The Committee would appreciate communications from those interested in the work of the engineering schools regarding the possibility of following out this plan in their own institutions:

1 In general, theses as presented to the universities are not in printed form and are not available for distribution. As a rule they are typewritten and about five copies represent the limit of successful duplication. One of these copies is retained by the university as a record and is available for reference in the library, other copies are retained by the student-authors themselves, and the remainder are ordinarily presented to members of the faculty under whose direction the work was performed.

2 Announcements in the Research Section have brought forth many requests for copies or for information. In most cases these requests cannot be complied with owing to prohibitive costs and lack of facilities for reproduction.

3 The result is, therefore, that much valuable technical information which might otherwise be available is tied up in the archives of the universities.

4 To remedy this situation it is suggested that the universities require their graduate or advanced students, at the expense of the university or departments of the same, to present in each case an additional copy of their thesis, which, if considered of sufficient merit is to be forwarded to the Library of The American Society of Mechanical Engineers. A copy would then be available for reference there or for publication either as a whole or in abstract in MECHANICAL ENGINEERING, and all requests for information regarding the same or for copies in part or in whole could be handled directly by the Society at the usual price for such work.

Committee for Scientific and Industrial Research

The Sixth Annual Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1920–21 has just been issued. The report describes the activity of the Committee during the year, includes a list of the various associations of Great Britain and in Part II the question of national research and the development of research in and for the Empire is treated. Part III covers aided research, patents and publications of learned societies.

The report may be obtained for 1s. 2½d. from Imperial House, Kingsway, London, WC2.

A—RESEARCH RESULTS

The purpose of this section of Engineering Research is to give the origin of research information which has been completed, to give a résumé of research results with formulas or curves where such may be readily given, and to report results of non-extensive researches which, in the opinion of the investigators, do not warrant a paper.

Cement and Other Building Materials A14-21. FIRE TEST ON BUILDING COLUMNS. Technologic Paper 184 is devoted to Fire Tests on Building Columns. It is obtainable from the Superintendent of Documents at 75 cents per copy. The work was undertaken in coöperation with the Associated Factory Mutual Insurance Companies and the National Board of Underwriters. The column was placed in a gas-fired furnace and loaded to a safe working load. The loaded column was exposed to fire for a predetermined time, after which a hose stream was applied to the heated column. In other cases the column was heated. The columns were protected by various forms of fire-resisting materials and care was taken to duplicate actual building practice. Ninety-five fire tests were made and fifteen fire and water tests. The results of the tests are tabulated. Figures and diagrams are used to illustrate apparatus and results of the test. The results are summarized in terms of two-thirds of the average time in hours for the column under fire to have its strength reduced to failure. These periods varied from ten minutes for unprotected steel columns to 8 hours for columns covered with 4 in. of concrete made with fire-resistant aggregate and for reinforced columns made with the same aggregates. The series cover the range of current practice in structural-steel columns and the studies indicate that the results obtained are applicable to columns of various sizes. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Cement and Other Building Materials A15-21. COOLING OF FRESH CONCRETE IN ZERO WEATHER. Bulletin 123 of the Engineering Experiment Station, University of Illinois, by Tokujiro Yoshida, is on the subject of Studies on Cooling of Fresh Concrete in Freezing Weather. The investigation discusses the apparatus used for measuring temperature; concrete materials; mixing of concrete; general features of the experiments; preparation of test specimens; phenomena of experiments; rise in temperature during setting; calculation of the thermal constants of fresh concrete; effect of wood forms in protecting fresh concrete; effect of canvas in protecting fresh concrete; effect of amount of water used and summary of experimental results. This is followed by an analytical application to massive concrete, thin walls, beams and columns of rectangular and circular cross-sections, as well as some applications to work of concreting in freezing weather. The general conclusions are given as follows:

It is believed that the constants derived from the tests are applicable to the ordinary conditions of fresh concrete. The value of k, the diffusivity, is 0.0063; that of h, the ratio of the emissivity to the coefficient of conductivity, is 0.046.

From the cooling curves given for massive concrete, thin walls and slabs, and beams and columns, the time of cooling and the temperature attained by the concrete in any particular case may be estimated.

The protection afforded by board forms and by canvas is considerable, as was shown by the examples given.

If a canvas protection is used, care must be taken to prevent any circulation of cold air, and it is best to observe the temperature in the air space by means of a thermometer. Knowing this temperature, the time when the freezing temperature will penetrate into the concrete may be estimated from the diagrams and the necessity of using artificial heat determined.

The heating of the materials is seen to furnish an excellent method of insuring early hardening and delaying the fall in temperature. It is much to be preferred to the use of chemicals.

The effect of the wind should also be given consideration.

The diagrams are of some value in connection with the determination of the time for the removal of the forms, since they will enable the temperature attained by the concrete to be estimated. As the concrete gains strength much more slowly at a low temperature and as frozen concrete is especially dangerous, information on the temperature attained is of value and the too early removal of forms may be avoided. If by this or other means the mean temperature of the concrete for a given time is known, the comparative strength of the concrete may be estimated from the diagrams given by Prof. A. B. McDaniel in Bulletin 81 of the Engineering Experiment Station of the University of Illinois, which shows the influence of temperature on the strength of concrete, and thus the judgment may be aided in deciding on the safe time to remove the forms. Address Dean C. R. Richards, University of Illinois, Urbana, Ill.

Fire Prevention A2-21. SPECIFICATIONS FOR FIRE HOSE. Circular 114 of the Bureau of Standards is devoted to specifications for fire hose. Specification was made to the Rubber Association of America and had received the official endorsement of its Committee on Technical Specifications. The specification covers cotton-lined hose of single, double- and triple-jacketed types. The chemical and physical tests to which hose must conform are described in detail. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Fuel Utilization A1-21. ATMOSPHERIC BURNERS. The Bureau of Standards has recently published Technologic Paper 193 on Design of Atmospheric Gas Burners. This may be obtained from the Superintendent of Documents, Washington, D. C. This paper does not give any presentation of theory, but it does give the effects of various factors on the operation of burners. These are shown by means of tables and curves based on experimental data. To arrive at these results it was found necessary to study the theory of the flow of gas through different types of orifices, the principles governing the rate of injection of air into the burner, the design of the injecting tube, the rate of consumption of burners for different port areas and the effect of adjustment of the air shutter. The paper points out that the atmospheric burner is well adapted for domestic and small industrial purposes on account of its

simplicity, low cost and reliability. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Metallurgy and Metallography A18-21. METALLOGRAPHIC TESTING. The second edition of Circular 42 of the Bureau of Standards on Metallographic Testing may be obtained from the Superintendent of Documents, Washington, D. C. Metallographic examination gives broader information of materials of engineering than the mere determination of mechanical properties. The circular describes briefly the conditions which effect the properties of metallic metals under the following headings: Microscopy and structure; thermal analysis and heat treatment; mechanical working of metals; chemical and metallurgical factors and conditions of melting. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Petroleum, Asphalt and Wood Products A8-21. BURIED STEEL FUEL-OIL TANKS. The Associated Factory Mutual Fire Insurance Companies have recently determined data regarding the life of buried fuel-oil tanks. The investigation covered the study of tanks which had been in service from 18 months to 26 years and were buried from 10 in. to 9 ft. below ground level. The soils were of sand, gravel, loam, clay or cinders or mixtures of these. In some cases ground water was present and in few cases salt tidewater. The tanks varied in capacity from 1,100 to 22,000 gal. In a few instances the tanks were entirely uncovered in making the investigation, while in other cases a section only was exposed. This section included one side to the center line and one end to same point. The character of corrosion, condition and thickness of shell were noted, and in a few cases the scale was examined for analysis. The results of the investigation are given in the following table:

Number in Report	Age in years	Depth of top below ground	Protection and condition	Character of soil surrounding tank	Location of tank
1	1½	2 ft.	Red lead & asphalt Excellent	Salt marsh lower half, fill above	Everett, Mass.
2	7	2 ft.	Red lead	Clay, sand,	
9	10	2 ft.	Excellent	trace of cinders	So. Boston, Mass.
3	7	5 ft.	Probably asphalt Fair	Clay, sand and cinders. Salt tidewater	New Bedford, Mass
4	7	7 ft.	Red lead & asphalt Excellent	Sand and gravel ground water	Waterbury, Conn.
5	8	3 ft.	Asphalt Good	Sand, loam and gravel	Lowell, Mass.
6	9	2 ft.	Probably asphalt Good	Sand, gravel and cinders.	Worcester, Mass.
7	9	3 ft.	Asphalt Fair	Sand, gravel, loam, cinders	Waltham, Mass.
8	10	4 ft.	Probably asphalt Good	Sand, loam, trace of cinders	Waterville, Conn.
10	11	7 ft.	Thick coat asphalt Excellent	Sand, gravel, few cinders	Waterbury, Conn.
11	11	4 ft.	Asphalt Good	Clay and sand	So. Auburn, R. I.
12	12	5 ft.	Asphalt Excellent	Oil-saturated sand. Salt tide water	New Bedford, Mass.
13	12	8 ft.	Concrete Good	Encased in concrete except at manhole. Ground water	Taunton, Mass.
14	13	2 ft.	Red lead asphalt Excellent	Sand and loam	Waterbury, Conn.
15	13	2 ft.	Red lead	Oily saturated	
16	13	2 ft.	Good	sand and clay. Ground water	Lowell, Mass.
17	14	6 ft.	Probably asphalt Poor	Sand, gravel, cinders trace of oil. Ground water and acid	Waterbury, Conn.
18	15	2 ft.	Red lead Excellent	Black mud, formerly salt marsh. Ground water	Lynn, Mass.
19	15	9 ft.	Red lead & asphalt Excellent	Oily sand, brackish ground water	Taunton, Mass.
20	15	2 ft.	Asphalt Excellent	Clay, sand, trace of cinders	So. Boston, Mass.
21	16	3 ft.	Probably asphalt Good	Sand, cinders	Fitchburg, Mass.
22	17	5 ft.	None Fair	Sand, gravel, cinders	Pawtucket, R. I.
23 & 24	18	9 ft.	Red lead and tar Poor inside	Salt water, some cinders	Brooklyn, N. Y.
25	20	1 ft.	Red lead Excellent	Sand and gravel	Providence, R. I.
26	20	2 ft.	Asphalt Excellent	Loam, clay and cinders	Cambridge, Mass.
27	20	2 ft.	Probably none Good	Clay and sand Ground water	Whitins, Mass.
28	26	2 ft.	Red lead Good	Sand and gravel	Whitins, Mass.

The electrolytic theory of corrosion is the most acceptable one. Before iron can oxidize it must pass into solution liberating oxygen. Wet places with acids stimulate this. Corrosion will not take place without oxygen being present, hence tanks should be buried where conditions will not stimulate corrosion.

Fill. Cinders stimulate corrosion. Acid may be present in this soil. Loam is a better type of fill than cinders although it may stimulate corrosion because its absorptive power furnished the essential of corrosion: oxygen and moisture. Clay is better than loam for filling. It is generally damp and prevents corrosion because it holds the water in a stagnant condition. Sand is the best filler as it prevents surface impurities from reaching the tank. Oily sand gives the best protection. Gravel is not quite as good as sand.

Protective Coating. Red lead when used alone allows contact between metal and corroding medium as film may be easily punctured. Asphalt when used alone also permits contact. Red lead followed by asphalt gives good results. All tanks reported in excellent condition were protected by red lead, asphalt or both. No tanks examined were entirely encased in concrete. It is reasonable to suppose that concrete would offer a good protection.

Tidewater and Ground Water. Tidewater and ground water do not stimulate corrosion to any great extent. Salt water usually forms a hard encrustation. Ground water acts similar but may stimulate corrosion when the oxygen content is great.

Depth of Bury. If a tank is buried below the zone of active oxygen it is usually below the zone of corrosion. As the depth of bury increases the tendency to corrode decreases.

Stray Electrical Currents. Stray electrical currents stimulate corrosion but these are not frequent.

Conclusions. Steel tanks buried under favorable conditions may last more than 30 years. In damp ground they will last from 15 to 20 years. To best resist corrosion steel tanks should be coated with red lead and asphalt buried in clean sand three feet deep or more below surface, avoiding ground water and tidewater if possible. Address Factory Mutual Laboratories, C. W. Mowry, Director, Boston, Mass.

Petroleum, Asphalt and Wood Products A9-21. PETROLEUM LAWS. Petroleum laws of all America is the subject of Bulletin 206 of the Bureau of Mines. The work contains 645 pages and gives the national and state laws of the various countries. Address Bureau of Mines, Washington, D. C. H. Foster Bain, Director.

Petroleum, Asphalt and Wood Products A10-21. SANITATION. Oil-Camp Sanitation is the subject of Technical Paper 261 by C. P. Bowie. This bulletin of 32 pages discusses the construction of buildings and various conveniences and the matter of mosquitoes and flies; as well as the location of camps, spacing of buildings, water supply and disposal of garbage, sewage and refuse. Bureau of Mines, Washington, D. C. Address H. Foster Bain.

Properties of Engineering Materials A6-21. MANILA ROPES. The Bureau of Standards has recently issued Technologic Paper 198 on Tests of Manila Rope. This may be obtained from the Superintendent of Documents, Washington, D. C. Ropes tested range from diameters of ½ in. to 4½ in. and consisted of commercial, three-strand, regular-lay ropes. The breaking load, weight per linear foot, number of yarns and the lay of the rope and strands as well as the elongation were measured. The average breaking load is given by the equation

$$L = cd\ (d + 1)$$

where L = load in pounds
c = constant = 500
d = diameter of rope in inches.

The modulus of elasticity was not constant. There is no well-defined elastic limit. The number of yarns in a rope is usually given by the equation

$$N = 50 \times d(d + 0.4)$$

where N = number of yarns
d = diameter of rope in inches.

Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

B—RESEARCH IN PROGRESS

The purpose of this section of Engineering Research is to bring together those who are working on the same problem for coöperation or conference, to prevent unnecessary duplication of work and to inform the profession of the investigators who are engaged upon research problems. The addresses of these investigators are given for the purpose of correspondence.

Automotive Vehicles and Equipment B7-21. EQUIPMENT FOR TESTING AUTOMOBILE BRAKE LININGS. The Bureau of Standards is developing apparatus for the purpose of testing brake linings. Blueprints of the apparatus have been sent to manufacturers of linings. It is hoped to standardize the method of testing this important product. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Friction B1-21. EFFECT OF OIL GROOVES IN BEARINGS OF VARYING SIZES AND SPEEDS. This investigation is being carried on by Mr. Lessels, of the Mechanical Laboratory of the Carnegie Institute of Technology. Address David C. Saylor, Instructor, Mechanical Laboratory, Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa.

Heat B22-21. HEAT CONDUCTIVITY. An investigation on heat conductivity is being undertaken by Mr. Mawhinney in the Mechanical Laboratory of the Carnegie Institute of Technology. Address David C. Saylor, Instructor, Mechanical Laboratory, Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa.

Internal-Combustion Motors B10-21. SOLID INJECTION OF FUEL IN OIL ENGINES. Solid injection of fuel oil is being investigated by Mr. Zeisham of the Carnegie Institute of Technology. Address David C. Saylor,

Instructor, Mechanical Laboratory, Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa.

C—Research Problems

The purpose of this section of Engineering Research is to bring together persons who desire coöperation in research work or to bring together those who have problems and no equipment with those who are equipped to carry on research. It is hoped that those desiring coöperation or aid will state problems for publication in this section.

D—Research Equipment

The purpose of this section of Engineering Research is to give in concise form notes regarding the equipment of laboratories for mutual information and for the purpose of informing the profession of the equipment in various laboratories so that persons desiring special investigations may know where such work may be done.

E—Research Personnel

The purpose of this section of Engineering Research is to give notes of a personal nature regarding the personnel of various laboratories, methods of procedure for commercial work or notes regarding the conduct of various laboratories.

F—Bibliographies

The purpose of this section of Engineering Research is to inform the profession of bibliographies which have been prepared. In general this work is done at the expense of the Society. Extensive bibliographies require the approval of the Research Committee. All bibliographies are loaned for a period of one month only. Additional copies are available, however, for periods of two weeks to members of the A.S.M.E. These bibliographies are on file at the office of the Society.

WORK OF THE A.S.M.E. BOILER CODE COMMITTEE

THE Boiler Code Committee meets monthly for the purpose of considering communications relative to the Boiler Code. Any one desiring information as to the application of the Code is requested to communicate with the Secretary of the Committee, Mr. C. W. Obert, 29 West 39th St., New York, N. Y.

The procedure of the Committee in handling the cases is as follows: All inquiries must be in written form before they are accepted for consideration. Copies are sent by the Secretary of the Committee to all of the members of the Committee. The interpretation, in the form of a reply, is then prepared by the Committee and passed upon at a regular meeting of the Committee. This interpretation is later submitted to the Council of the Society for approval, after which it is issued to the inquirer and simultaneously published in Mechanical Engineering.

Below are given the interpretations of the Committee in Cases Nos. 364 to 369 inclusive, as formulated at the meeting of September 12, 1921, and approved by the Council. In accordance with the Committee's customary practice, the names of inquirers have been omitted.

Case No. 364

Inquiry: Is it necessary, as indicated in the index to the Boiler Code, to use an extra thick tube for the fusible plug when used with a vertical fire-tube boiler, in accordance with the requirements of Pars. 429 and 430?

Reply: It is the opinion of the Committee that inasmuch as Par. 429 permits of the use of a $^3/_8$-in. fusible plug, it would be desirable to insert it in a tube having a thickness of not less than 0.22 in. in order to allow insertion of at least four threads of the fusible plug.

Case No. 365

(In the hands of the Committee)

Cases No. 366 and 367

(Annulled)

Case No. 368

Inquiry: Is it permissible, under the requirements of Par. 185 of the Boiler Code, to plane or mill down the plates forming the laps of circumferential joints to less than $^1/_2$ in. thickness?

Reply: It is the opinion of the Committee that there is no objection to planing down the laps of circumferential joints to a thickness less than $^1/_2$ in., provided, however, there is sufficient strength left in the joint to conform with the requirements of Par. 184.

Case No. 369

Inquiry: Is it necessary, under the requirement of Par. 195 of the Boiler Code, to increase the thickness of a dished head $^1/_8$ in. when a manhole is inserted and provided the manhole opening is reinforced?

Reply: It is the opinion of the Committee that the requirement in Par. 195 for increase of $^1/_8$ in. in thickness is applicable in any case when a manhole is inserted in a dished head.

Public Hearing on Proposed Code for Air Tanks and Pressure Vessels

The Boiler Code Committee announces progress in the formulation of the proposed code for air tanks and pressure vessels intended to form Section IV of the A.S.M.E. Boiler Code, and that a Public Hearing will be held in connection with the coming A.S.M.E. Annual Meeting in order that all interested in unfired pressure vessels may have an opportunity to participate in the discussion of the proposed rules.

The Hearing will be held in the United Engineering Societies Building, 29 W. 39th St., New York, N. Y., on Monday, December 5, at 9.30 a.m., the opening day of the Annual Meeting. Every one interested in the formulation of this code is cordially invited by the Committee to attend and join in the discussion.

A revised draft of this proposed code is now under preparation and every effort will be made by the Committee to distribute copies thereof to its large mailing list of boiler and tank users and manufacturers well in advance of the Hearing. Copies thereof will also be available for distribution at the Hearing.

Public Hearing on Proposed Code for Miniature Boilers

The Boiler Code Committee announces also that the proposed code for the construction of miniature boilers has been completely revised and will be presented at a Public Hearing to be held in the United Engineering Societies Building, on Tuesday, December 6, at 9.30 a.m. This code is greatly in demand due to the increasing use of the small types of boilers for vulcanizing, clothes-pressing and laundry purposes, and has been looked forward to with interest; this code has not previously been brought before the Society for public discussion. Every one interested in the details of this Code are cordially invited by the Committee to attend and take part in the discussion.

Section of Code on Boilers of Locomotives Completed

Those who have been interested in the formulation of rules for the construction of boilers of locomotives will no doubt be interested to learn that this difficult undertaking has been completed and the Code is being published initially in pamphlet form for distribution independent of the regular edition of the Boiler Code. It will be at first issued in a limited edition with distinctive paper cover but will, upon completion of the 1922 revision of the Code, be incorporated therein and form Section III thereof. This section of the Code is on sale and may be obtained upon application to the office of the Society.

HEAT BALANCE OF COLFAX STATION

(Continued from page 796)

iliary load, which are, of course, reflected in the house-turbine load. A series of experiments were recently conducted to determine how closely this system could be regulated and what the lag might be between the time that the load on the house turbine was changed and the time when the effect was noticed in the feedwater tank. It was found that any degree of regulation was possible. The house-turbine load could be varied in steps of 10 kw., it being impossible to read variations less than this. The feedwater temperature could be varied by amounts as low as 0.5 deg. fahr., which is as close as an ordinary thermometer can be read.

Table 1 of the complete paper shows actual operating figures for five days, chosen so as to show the operating conditions over a range of loads from 30,000 to 60,000 kw. The quantities shown in Fig. 2 are taken from this table.

MATERIAL HANDLING AN IMPORTANT FACTOR IN THE ELIMINATION OF INDUSTRIAL WASTE

(Continued from page 804)

assign a value to this item after thorough observation and careful consideration. Let us call it X per cent.

The variables in the investment value may be classed as follows:

A = interest charges on investment, per cent
B = interest to provide for upkeep of apparatus installed, per cent
C = interest to provide for depreciation due to age, per cent
D = interest to provide for progress in the art of the particular device proposed (subsequent inventions), per cent
E = interest to provide for extensions to service, per cent
H = additional superintendence and overhead expenses due to change in method, per cent
K = interest to provide for taxes, per cent
F = cost of power, supplies and other variable items in dollars per year

Let S = yearly saving in labor in dollars
and Z = investment in dollars justified by the foregoing considerations

$$\text{then } Z = \frac{S\ (X \text{ per cent}) - F}{(A + B + C + D + E + H + K) \text{ per cent}}.$$

Working this out for an assumed set of conditions, assume that the work which under the present methods of moving materials requires four men employed at $3 per day, 300 days per year, at a yearly cost of $3600, can be done according to the new method by one man, costing $900, thus saving $2700 per year. The plant operates on shift, men employed 80 per cent of the year.

Then $X = 80$ per cent $C = 15$ per cent $H = 3$ per cent
$S = \$2{,}700$ $D = 10$ per cent $K = 3$ per cent
$A = 6$ per cent $E = 3$ per cent $F = \$400$
$B = 20$ per cent

$$\text{and } Z = \frac{(\$2{,}700 \times 0.80) - 400}{0.60}$$

$$= \$2{,}933.33$$

This means, then, that equipment costing under $2,900 will earn maintenance, interest, depreciation, obsolescence and tax charges and show a saving besides.

Assuming that an electric-storage-battery industrial truck costing $1,750 will meet the conditions, the yearly operating cost would be as follows:

I = cost of equipment = $1,750
Y = yearly operating cost
$= I\ (A + B + C + D + E + H + K) + F$
$= (\$1{,}750 \times 0.60) + 400 = \$1{,}450$

Then

$$S = \$2{,}700 - \$1{,}450 = \$1{,}250$$

This is an actual saving of $1,250 a year, a return of approximately 71 per cent on the investment over and above all interest charges, upkeep, deterioration and obsolescence.

Only by some such analysis can a real solution of the problem be obtained. Unfortunately salesmen in their eagerness to take orders, and managers in their ignorance of the underlying conditions, sometimes overlook some of the factors in the problem with the result that anticipated savings are not obtained.

Too much thought and consideration cannot be given to the selection of equipment that not only shows a saving but fits into the general operating conditions of the plant, or suits physical conditions imposed by plant or location, and yet at the same time fits into plans for future extension, development or rehabilitation of the plant. A $25,000 locomotive crane will last a long time if properly cared for. If future development of the plant does not provide space enough for the utilization of the crane to its best advantage, then the crane may not be the piece of equipment to select initially, even though it will satisfy all of the initial conditions.

A.S.M.E. TO PUBLISH LIFE OF GEORGE WESTINGHOUSE

The mere fact that a Life of George Westinghouse is to be published is an item of interest to every engineer who glories in the great men of his profession. Added interest is given to the announcement, however, by the fact that Col. Henry G. Prout, the author of this biography soon to be published in a limited subscription edition by The American Society of Mechanical Engineers,

GEORGE WESTINGHOUSE

has used his consummate skill and intimate knowledge of his subject to build a book at once interesting, inspiring and permanent.

This limited edition, which will appear in both morocco and buckram binding, was offered simultaneously to the members of the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, The American Society of Mechanical Engineers, and the American Institute of Electrical Engineers. Although subscriptions to this edition were to be closed November 15, delay at the printers makes it possible to accept subscriptions up to December 6, and A.S.M.E. members who have not done so are urged to secure a copy of this valuable book by writing to Secretary Calvin W. Rice at once. The subscription binding in buckram with gilt top and silk headband can be procured for $3.50 postpaid. A special half morocco binding will be sent for $6.00.

Later a popular edition will be issued and copies of this edition, it is expected, will be available about February, 1922.

MECHANICAL ENGINEERING

A Monthly Journal Containing a Review of Progress and Attainments in Mechanical Engineering and Related Fields, The Engineering Index (of current engineering literature), together with a Summary of the Activities, Papers and Proceedings of

The American Society of Mechanical Engineers

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C 55 The Society as a body is not responsible for the statements of facts or opinions advanced in papers or discussions.

Armament Reduction and the Engineer

THE engineering profession ought to be in favor of a reduction of armament, not alone because it will tend to make it more difficult to begin a war, but also for essentially technical reasons.

From an engineering point of view the actual production of many classes of munitions in anticipation of a war which may not occur for a long time appears to be a wasteful and highly undesirable proceeding.

G. E. TRIPP

Such a policy is necessary only as a defence against surprise attack, but it is not true preparedness, and it really tends to weaken the ability of the nation to withstand external aggression.

Modern warfare is not only a contest between the armies and navies of the belligerents, as was the case some three score years ago, but one between the entire industrial and scientific structures of nations.

A truck or tractor factory, a foundry, a plant making motors, fabrics or chemicals, is as much an essential and often deciding part of the military establishment of a nation as is a gun factory. The high maintenance of the productive facilities of a country rests, therefore, at the very foundation of its ability to defend itself against external aggression.

Development of the productive facilities of a country, assuming, as in the case of the United States, the presence of ample natural resources and good natural stock of population, requires two things primarily, and they are ample capital and extensive educational facilities for the people.

Neither of these two conditions can be easily satisfied when Government expenditures reach the disquieting figure of four billions of dollars or more per annum, and when roughly three-quarters of this vast sum is expended for purposes of a military character.

Engineers, more than any other class, realize how much still needs to be done to develop the natural resources of this country, and they also realize that it is by the development of natural resources in the past that the United States attained the state of prosperity and industrial efficiency which permitted it to raise and equip an army of nearly two million men in less than twelve months and to spend without essential embarrassment twenty-five billion dollars in two years for war expenditures.

Armament expenditures as carried out today undermine the ability of countries to attain their highest ideals of national education and industrial development, so that from the point of view of the engineer any agreement to disarm would tend to minimize the possibility of future conflicts and at the same time actually increase the ability of the great powers to protect themselves in case of unprovoked aggression.

The engineer is more and more acquiring a position of intellectual leadership in American communities, and his attitude toward reduction of armament as one of the fundamental questions affecting the industrial and intellectual growth and welfare of the world will have a tremendous influence.

G. E. TRIPP.

The Superpower Report

W. S. MURRAY

NO OBSERVANT person, whether he be a banker, a railroad operator, a manufacturer or an engineer, can have lived or traveled within the boundaries that have been recently marked as those comprising the Superpower Zone without the consciousness that this territory is the most remarkable in the world in its relation to power and transportation requirement.

The United States Government created as effective on July 1, 1920, and engineering organization to investigate and report upon the "possible economy of fuel, labor and material, resulting from the use in the Boston-Washington region of a comprehensive system for generating and distributing electricity to transportation lines and industries." This organization, known as the Superpower Survey, was promptly organized as of that date; all data were collected and assembled, and its report transmitted on June 30, 1921, to Dr. George Otis Smith, Director of the U. S. Geological Survey, under the auspices of whose department the work was conducted.

The usual editing of report text and elimination of surface errors were accomplished in a remarkably short time by Director Smith's department and the report was transmitted to the President by Secretary of the Interior Fall on November 5, 1921, and has become the people's document known as Professional Paper 123.

As chairman of the Superpower Survey I was naturally brought into close personal and professional touch with the engineering associates that I was permitted to select. The report is divided into three major sections of investigation:

1 Electric power production and transmission
2 Railway electrification
3 Industrial electrification.

Respectively at the heads of these departments of investigation were Mr. Lorin E. Imlay, Dr. Cary T. Hutchinson, and Mr. Henry W. Butler. Mr. Henry Flood, Jr., as engineer-secretary of the Superpower Survey, was assigned to the duty of collaborating with these three departments and preparing the data in as near form to report text as possible.

To these men, their able assistants and other outside associated eminent engineers, belongs the credit for the report, for it was clear that only through the utmost coöperative effort and full agreement on the part of the entire engineering staff could it be produced within the time assigned by Congress.

During the early period of the work, engineering staff meetings were called every two weeks. Procedure and progress in all departments of the work were discussed at these meetings, and as it advanced the interval of time between them was increased. Eighteen engineering staff meetings were held. Contemporaneously, but at intervals of two months instead of two weeks, the Advisory Board was convened and our progress discussed. Too much cannot be said for the loyal attendance and assistance resulting from these well-attended Advisory Board meetings led by Prof. L. P. Breckenridge, head of the department of mechanical

engineering at Sheffield Scientific School, Yale University, and chairman of the Advisory Board.

The report is summarized in its first pages, where among the conclusions presented it is stated that no later than 1930, through the unionization of electric utility, power production and the electrification of certain divisions of the railroads within the zone, and the acceptance of electric power from the electric utilities by the isolated industries in lieu of individual plant generation of their power, over $500,000,000 can be saved annually, and that the investment to cover will yield not less than 30 per cent. Such a possibility supported by the fact that in so doing 49,000,000 tons of coal can be saved annually, makes not only the engineer but any citizen in the zone feel that there may indeed be some truth in the oft-repeated statement that three prime powers in Europe could live in comparative luxury on the wastes of this nation.

W. S. MURRAY.

Problems and Progress of Iron and Steel Metallurgy in France.

THE Great War ended three years ago, but the iron and steel industry in France still feels its effects and will feel them for many years to come. The results have been terrible.

PROF. JACQUES CAVALIER

For more than four years the enemy occupied about seven per cent of the territory of my country, the parts thus invaded being among the most important and the richest above all for metallurgy. It is just as if in the United States the metallurgical industry had been deprived of the states of Pennsylvania, Ohio, Maryland, Virginia, Carolina and Georgia.

A few figures will serve to show the influence of the invasion on production.

	—Production in 1913— Total	Invaded zone	Proportion in the country invaded
Coal[1]	40,844,000 tons	20,000,000 tons	50 per cent
Coke	4,000,000 tons	3,080,000 tons	76 per cent
Iron ores	22,000,000 tons	18,000,000 tons	86 per cent
Cast iron	5,207,000 tons	3,336,000 tons	64 per cent
Steel	4,686,000 tons	2,934,000 tons	63 per cent
Blast furnaces	170	85	50 per cent
Open-hearth furnaces	164	48	30 per cent
Bessemer converters	100	53	53 per cent

[1] Besides the twenty million tons in the invaded country, seven million of the region of the north were under the fire of the enemy.

This enormous cutting down of the means of production would not have been very serious if, as the leaders of the different armies had expected, the war had been short and had been conducted with only the munitions on hand. But after the Battle of the Marne these munitions were exhausted, and it became necessary to organize for a war of indeterminate length and to assure an unfailing supply of munitions to the armies.

At the beginning provision was made for a production of ten to twenty thousand shells a day; toward the middle of 1917 there were being turned out every twenty-four hours 300,000 shells for 75-mm. guns, 30,000 for 120-mm., and 50,000 for 155-mm. guns, without counting projectiles of larger caliber. In this our first effort we asked foreign countries, friendly or neutral, for the necessary metal. The American industries furnished us with considerable quantities of steel, and thus gave us help of inestimable value.

At the same time we sought to increase the means of production of metal and new installations were put in with a speed which doubtless is usual in the United States, but which is much rarer in Europe. In February, 1916, La Société Normande de Métallurgie resumed the work it had started in the neighborhood of Caen at the beginning of the War; in January, 1917, it put into operation a battery of coke ovens; in August a 400-ton blast furnace; and in, June, 1918, a steel works begun in January, 1917, and comprising five 30-ton converters and five 30-ton open-hearth furnaces.

Other industrial establishments made like efforts and as a result during the War there were built in France:

		Annual Production, Tons
12	Blast furnaces	600,000
103	Open-hearth furnaces	1,560,000
47	Converters	242,000
21	Electric furnaces	56,000

Before the War France had 24 electric furnaces.

If, after the victory of the Allied Armies and the liberation of the invaded territory France had found her workshops intact, the effort made during the War would have been followed by a growth of her industrial power. We know that this was not so. In the invaded regions of the north the Germans had wiped out the greater part of the coal mines and had destroyed 11,500 plants. This destruction had no military purpose; it was methodical and studied, the object being to place our country in a position of inferiority in the economic scale. I know personally of a small establishment in the suburbs of Lille where the Germans, not having time to destroy the steam plant, rendered it useless by filling it with concrete.

The work of rebuilding the destroyed factories is now under way and will require several years, especially in the case of the collieries. On the other hand, numerous plants in the interior of the country have increased in size and have put in more modern and better equipment. In general, however, this work has been held up for a year or so by the rise in prices and by the industrial crisis common to all industrial countries.

At the end of the period of which I have attempted to show some essential characteristics, the dominating idea was to produce at a maximum by the usual methods without seeking new ones. At the same time, it is necessary to point out several things relating to the progress of the iron and steel industry.

First, the development of the electric furnace. Among European nations France is one of the richest in hydraulic power, the total energy available being from eight to ten million horsepower. At the beginning of the War, however, only a little more than a million horsepower had been harnessed, of which 750,000 was in the Alps and 150,000 in the Pyrenees.

The power resources of Pyrenees are not only much less than those of the Alps but proportionally they have been less developed. This is about to be corrected.

The building and equipment of a hydroelectric system generally requires many months, often several years; we hesitated to undertake the work as long as it was believed that the War would be of short duration, and it was only about 1916 that it was begun. We have thus been able to equip in addition to what we already had about 400,000 hp., while 400,000 hp. more are in process of installation. It is necessary to take into consideration also the projects which are now being studied for the harnessing of the Rhone and the Rhine. Only a part of this new energy has been applied to the steel industry; the electric furnace has above all been reserved for high-grade or special steels, and for the preparation of ferro-alloys and silicon alloys for which it is indispensable. The greater part of the electric energy was destined for purely chemical manufacture: electrolytic chlorine, chlorates and perchlorates, and especially synthetic nitric acid, for which we laid out and commenced to realize a vast program when the enormous increase in the number of ships torpedoed caused us to have serious fear for the continuation of our supply of nitrate of soda from Chile.

With the ending of the War these latter needs have almost disappeared. The plants equipped or in process of installation have become available for other uses, namely, railway electrification, metallurgy, etc. Indeed, the writer can cite in the neighborhood of Toulouse two such plants, that of Pamiers and the La Société du Saut du Tarn à St. Juery, near Albi, that have recently made important installations of electric furnaces for the manufacture of steel.

In another plant in the Pyrenees region it is proposed to install a closed furnace for the direct treatment of ore, particularly pyrite cinder. Although the electric furnace is well adapted to the treatment of sulphide residues, it is nevertheless questionable whether the direct production of cast iron can be accomplished economically in a country where electric energy finds so many remunerative uses.

Second, the electric furnace is used for the manufacture of

synthetic cast iron according to the process outlined by Keller long before 1914 and which was made use of during the War. An electric furnace is charged with turnings and small scrap of iron and steel with a given quantity of coal in the presence of a slag which makes the operation more regular and in addition can bring about desulphurization. If it is necessary to increase the silicon content, silica and the corresponding quantity of coke are added. The cast iron thus obtained is according to specification and very pure, particularly in regard to the sulphur content. The process has the advantage of permitting the easy utilization of turnings, of which there was a great abundance during the War, and it has furnished large quantities of cast iron for the manufacture of projectiles. I have lately seen in the Pyrenees a plant normally making silico-manganese which, not being able to get rid of its stock on account of the industrial crisis, utilizes part of its electric furnaces for the manufacture of synthetic cast iron. At the present prices of good cast iron and of scrap and turnings it is actually a paying operation, but whether it will be when conditions have become normal once more, is a question.

Third, the development of the use of scientific methods. The progress realized by systematic study in the laboratory usually penetrates slowly into industrial practice. Producers in the average industry have a tendency to consider the laboratory as a luxury which does not pay.

The War, in bringing together for the national defense the industrialists and the men of science in the process of intensive production of metal, has powerfully contributed to the employment and to the diffusion of new and precise methods of work and of control.

The measurement of high temperatures has become very general, especially for the heat treatment of shells.

Microscopic examination has been carried out systematically, as, for example, in the manufacture of cartridge cases, where the brass undergoes successive annealings. A simple and rapid microscopic examination shows whether annealing has been done at the right temperature and under the right conditions, or if it is necessary to reanneal before further mechanical working.

In regard to the mechanical tests which are commonly used, special mention should be made of the Brinell test and the shock test on notched bars. The Brinell test has been used particularly to control the heat treatment of shells; it is employed before any treatment, after quenching, and at the end of the treatment after drawing. Special schemes have been studied and put in practice for eliminating the influence of time in this test in order to allow great rapidity of execution without affecting precision. On a series of pieces 600 impressions an hour have been easily obtained. During the period when the manufacture of shells reached its maximum, say, 300,000 to 400,000 a day, it can be said that there were 800,000 Brinell tests made in the same time. The shock test on notched bars made its appearance before the War, but it was introduced very timidly and met with much opposition on the part of the manufacturers. During the War the Aeronautical Branch, which had need of exceptional guarantees, found the introduction of this test indispensable in the inspection of crankshafts and connecting rods for aviation motors. These rods had to reach a number corresponding to 9 to 10 kg-m. on a test bar having a section of 10 by 10 mm. with a notch 2 by 2 mm. and rounded at the bottom.

While these different methods were doubtless employed before the War in a small measure, they rapidly became common during the conflict, even in the most old-fashioned workshops. By a constant and accurate control they caused a large reduction of rejections and in this way speeded up production. Manufacturers come to accept clauses in specifications with which they would have nothing to do previously.

Without doubt these good industrial habits which were acquired under the force of circumstances will continue. And thus the War will have contributed to the progress of our metallurgical industry, even though it be in a measure which only compensates to a slight extent for the great losses resulting from the destruction of our factories.

JACQUES CAVALIER.[1]

[1] Rector of the University of Toulouse, Toulouse, France; French Exchange Professor, at present at School of Mines, Columbia University, New York.

An Interprofessional Conference

ON October 27 representatives from each of eight important professional groups met at luncheon at the City Club in Philadelphia, as guests of the American Academy of Political and Social Science, for the purpose of ascertaining the present status as to ethical standards in each of the professions, and also for the purpose of securing suggestions as to whether or not public welfare could be advanced in any way at the present time by a discussion of both the need for better standards and the achievements as to standards in each of the professions. Of course questions of organization as an aid in the development of ethical conduct played an important part in the discussions.

At this conference Calvin W. Rice and Morris L. Cooke represented the engineers; W. E. Mikell and Roland S. Morris, the lawyers; Graham Taylor and Mary Van Kleeck, the social workers; R. D. Kohn and C. C. Zantzinger, the architects; W. D. Lewis and Clyde L. King, the teachers; A. D. Whiting, the doctors; Edmond Sterling, the journalists; and C. J. Rhoads, the business men.

The conference decided unanimously that the Academy should issue a symposium as soon as possible dealing with the ideals and practice as to ethical standards in each of the leading professions. More important still, the conference was requested by the Academy to act as a permanent agency to plan interprofessional activities and to seek to inspire organizations to create and enforce ethical standards in the professions not yet very thoroughly organized. Thus, it was the opinion of the conference that there was no reason why journalists should not have an organization and ethical standards comparable to those of the engineers and notably of the architects. The need was also pointed out for such organization among social workers and particularly among business men. The Academy agreed to publish such a symposium this coming May, and steps have already been taken toward that end. Steps are also being taken to advance the establishment and the maintenance of recognized ethical standards among journalists, teachers, social workers and business men. Interprofessional gatherings similar to this Philadelphia meeting are projected in a number of cities.

The keynote of the meeting was the maintaining of a public point of view looking toward a standard of conduct which will protect society from any menace from the professions as well as make the professions conscious of their public obligations and opportunities. It was very eloquently pointed out at this meeting that the professions are in a very peculiar sense the custodians of the service motive, and that if civilization is to be served the professions must see to it that this service motive is visualized and made dominant in every form of human activity.

CLYDE E. KING.[1]

[1] Editor of the Annals of The Academy of Political and Social Science.

New Member of Engineering Foundation Board

Arthur Lucian Walker, professor of metallurgy in the Schools of Mines, Engineering and Chemistry of Columbia University, New York, has been appointed representative of the American Institute of Mining and Metallurgical Engineers on the Engineering Foundation Board, to succeed Dr. Joseph W. Richards, deceased.

Professor Walker was engaged in chemical and engineering work until 1887, when he became general superintendent of the Old Dominion Copper Co., Arizona. Six years later he was appointed manager of the Baltimore Electrolytic Refining Company and in 1899 manager of the Perth Amboy, N. J., plant of the American Smelting & Refining Company, of which he was director from 1906 to 1907. He has been professor of metallurgy at Columbia since 1908. He served as consulting metallurgist at large for ordnance, War Department, 1917–1918.

In 1898 Professor Walker invented the Walker mechanical casting machine, which revolutionized methods used for casting copper into refined shapes and is now extensively used in all copper-producing countries in the world. In 1902 he invented a new system of tank-room arrangement, for use in electrolytic copper refining, which has been installed in practically all copper-refining plants built since that time. He has been retained by a number of large companies as consulting metallurgist, specializing in copper.

Final Plans for A.S.M.E. Annual Meeting, December 5-9

Two Strong Speakers Will Address Leading Session—Important Meetings on Education Scheduled—Interesting Social Features and Excursions Planned

Speakers for Principal Session

Two speakers have been announced for the principal session of the meeting on Monday afternoon. Fred J. Miller, Past-President of the Society, will interpret the spirit of the report of the Committee on Elimination of Waste in Industry. He will be followed by W. H. Sullivan, Vice-President and General Manager of the Great Southern Lumber Company of Bogalusa, La., who will outline the principles followed in the elimination of wastes in the Bogalusa development of the Great Southern Lumber Company, which is an outstanding example of what can be done in an industry which has suffered from great wastes that have seemed unavoidable.

Education

Attention is again called to the two notable sessions on Education. Monday evening, Education and Training in the Industries will be considered. Thursday afternoon the Society for the Promotion of Engineering Education will hold a joint session with The American Society of Mechanical Engineers, at which the needs of Professional Education for the Industries will be discussed by F. C. Pratt, vice-president of the General Electric Company and president of the Yale Engineering Association; J. E. Otterson, president of the Winchester Repeating Arms Company; Dexter S. Kimball, dean of the College of Engineering, Cornell University, and president-elect A.S.M.E.; and A. G. Christie, professor of mechanical engineering at Johns Hopkins University, and chairman of the A.S.M.E. Power Division.

Many Features to Interest Ladies

The technical side of the meeting has been well developed and its success from this point of view is assured. The interest of the ladies, however, is greatly desired so that the social features which have been given careful consideration in the plans for this meeting will be equally successful. Many ladies who have become enthusiasts of A.S.M.E. meetings complain that they are obliged to seek diligently for the information they want about the meeting activities that will be of interest to them. To avoid this criticism, each member should take his circular home and go over the points of interest that will be of value to the ladies of the family.

Changes in Tentative Program

As indicated in the circular which was sent to the membership during November, a General Session will be held on Thursday afternoon and another General Session on Friday afternoon. The paper by Major Gilbert D. Fish on Stresses and Deformations in Flat Circular Cylinder Heads, a Mathematical Analysis, and the paper by R. F. Wood on Control of Centrifugal Castings by Calculation, have been assigned to the Thursday afternoon session. The Friday afternoon session will be devoted to the paper by F. W. Dean on Tests on Emergency Fleet Boilers Using Oil Fuel. At the same session a paper by Messrs. L. A. Quayle and E. H. Brown giving Results of Tests on Pumping Engines of the City Water Works of Cleveland and a paper on Steam Condensing Plants by Paul A. Bancel, will be presented. The paper presented by Messrs. Quayle and Brown gives noteworthy results of tests on pumping engines, the thermal efficiency of the engine tested comparing more than favorably with any other prime movers that have been tested recently. Mr. Bancel's paper will be presented by title and the meeting will be thrown open to a discussion thereof.

The Aeronautic Division has completed its program and will have three papers as follows:

Study of the Elastic Properties of Small-Size Wire Cable, R. R. Moore

Commercial Operation of Airplanes, Maj. L. B. Lent

Problems of Commercial Operation in the Light of European Experience, R. B. C. Noorduyn

A paper of vital importance in the Diesel field will be presented at the Gas Power Session. Elmer A. Sperry, after twenty years of experiment, has completed a successful compound Diesel engine and will make public the results of his work. It can be confidently stated that the presentation of particulars of this epoch-making device will be of great interest and will develop important discussion.

The Fuel Division will complement its program by showing moving pictures of stoker operation. This film, prepared by R. Stanford Riley, of Worcester, Mass., and viewed by several representatives of the Society, all of whom are enthusiastic in their statements as to its value, will show actual combustion conditions in underfeed stoker operation. Mr. Riley will introduce the film with an account of the experiments which made this moving picture possible.

Student Session

The student members of the Society will hold a session on Thursday morning. A paper will be presented by W. K. Ramsay of M. I. T. on Draft-Tube Design, and another by George E. Lyon of Rensselaer Polytechnic Institute. This session gives the older members a fine opportunity to show their interest in the valuable work being carried on by the Student Branches of the Society.

Excursions and Social Features

The excursion program so far arranged offers opportunities to visit the Essex Power Station of the New Jersey Public Service Company, and the plant of the Seaboard By-Product Company of Jersey City which obtains numerous by-products in addition to coke and gas from coal. Their plant will be of considerable interest to the Fuel, Power and Gas Power Divisions. On Friday afternoon an excursion will be made to the White Star liner *Olympic*. Members of the Society will be given the opportunity to inspect the entire ship and the passenger accommodations will be open to the ladies of the party. Afternoon tea will be served in the dining saloon.

Great enthusiasm is developing for the social events to be held in connection with the meeting. The dinner-dance which will be held Thursday night at the Hotel Astor gives promise of being one of the most successful functions that the Society has held. The chairman of the committee in charge of this event is Major Edward Van Winkle, who has had much experience with affairs of this sort, and he has given assurance that the entire function will be interesting.

College Reunions

The graduates of technical schools are looking forward to the various reunions to be held on Friday evening of the Meeting. Notices will be sent out by each of the alumni organizations regarding their respective affairs. The Cornell men are planning an exceptional event in a dinner to be held on this evening at the Waldorf-Astoria in honor of Dr. Farrand, newly installed president of the University, and Dean Kimball, head of the College of Engineering, who will take office as president of The American Society of Mechanical Engineers during this Annual Meeting. Other institutions which will hold reunions are the University of Illinois, Massachusetts Institute of Technology, Purdue University, Rensselaer Polytechnic Institute, Stevens Institute of Technology, Worcester Polytechnic Institute, and also the Princeton Engineering Society.

Business Meeting

The discussion of the Constitution and of various Society policies which has been planned for the Business Meeting has already aroused the attention of the membership. A stirring meeting is assured. Further particulars of the meeting will be found on pages 133 and 134 of Section II of this issue.

The Federated American Engineering Societies

Review of Progress Made by Federation during First Year—Summary of Committee Activities—Solidarity of Engineers the Chief Objective—The American Engineering Council to Meet at Washington Early in January

WITH the completion of the first year of The Federated American Engineering Societies it is well to review the progress made in consolidating the engineers of the country and providing a medium through which they may act as a unit in rendering public service involving engineering knowledge and experience. Such a review covers growth in membership, development of organization, definite work accomplished, and projects in hand, and may include plans for the future.

The Federation is a growing organization. Of the 30 national and 41 local and regional organizations which met in Washington on June 3 and 4, 1920, to create the F.A.E.S., representatives of 21 member societies and 9 organizations considering membership were present at the first meeting of the American Engineering Council, the governing body of the Federation, held in Washington Nov. 18–20, 1920. There are now 29 member societies, representing over 45,000 engineers, and applications for membership are receiving action at every meeting of the Executive Board of the American Engineering Council.

The work of the Federation is carried on under the direction of its governing body, and through standing and special committees representative of the member societies. Frequent requests for assistance in various state and national activities have resulted in the creation of many new committees during the past year. The present organization is shown by the accompanying chart, which indicates the relation of the committees to the governing body and to each other and gives their personnel.

It will be noted that the majority of the committees are dealing with matters of national importance. The value of the assistance that can be rendered by such an organization representing some of the best engineering minds of the nation, is immeasurable. The fact that governmental officials, both legislative and executive, heads of governmental departments, U. S. Chamber of Commerce, manufacturers' associations, etc., are constantly turning to the Federation for assistance, information and suggestions, indicates that it is recognized as an influential and constructive body.

One of the most constructive pieces of work accomplished by the Federation is the investigation conducted by its Committee on the Elimination of Waste in Industry. The report of this committee, which has recently been published, has attracted wide and favorable attention, has been of great assistance in various conferences, and has stimulated further action in several organizations. Several committees of the Unemployment Conference found the report valuable in their work. Messrs. Edward E. Hunt and Sanford E. Thompson, both members of the Waste Committee, were members of the conference, the former as secretary. The boot and shoe, the ready-made clothing, the building, and the printing reports have all been used in connection with the settlement of labor troubles in these respective industries. The findings of the Waste Report have been or will be considered by the following groups in their annual or semi-annual meetings: National Cost Accountants Association; Society of Industrial Engineers; Industrial Management Council of the Chamber of Commerce, Rochester, N. Y.; United Typothetae of America; and The American Society of Mechanical Engineers. Official inquiries have come from Australia, Canada, Czecho-Slovakia, and England concerning the purpose, methods, and results of the investigation. The Department of Commerce has given careful consideration to the Waste Report and through the Bureau of Standards will carry on some of the investigations recommended therein.

At the present time there are several bills pending in Congress in which the Federation is taking an active interest. Among these are the War Minerals Liberalization Act, and bills concerning topographic mapping, the status of sanitary engineers, and patents. The first-named would reopen cases adjusted by the War Minerals Relief Commission, of which Philip N. Moore and Horace G. Pomeroy were engineer-members. The F.A.E.S. is opposing this act and is supporting a resolution introduced to provide for the return to the U. S. Treasury of the fund of several million left by the Commission. A bill providing a definite plan for the completion of a topographical map of the entire United States is also being supported by the Federation; and it has helped draft and had introduced a bill securing commissioned status for sanitary engineers of the U. S. Public Health Service. Through its Patents Committee, it is opposing the Stanley bill and supporting the Lampert Bill. Previous issues of MECHANICAL ENGINEERING have contained details concerning these items of legislation. Owing to the activities of the Patents Committee the Stanley Bill has been recommitted to the Patents Committee of the Senate, and hearings will be held at which representatives of the F.A.E.S. Patents Committee will be present.

Representatives of the F.A.E.S. have coöperated with the Department of Commerce in organizing a conference of highway engineers to consider the advisability of "fall-letting" of highway construction contracts. The statement prepared by this conference formed the basis of a letter addressed by the Secretary of Commerce to the governors of all the states, in response to which favorable comment and action have been forthcoming.

Information is also being gathered pertaining to letting of fall contracts for other types of construction than that of highways.

The F.A.E.S. has supported activities leading to the creation of a Department of Public Works. Present indications are that civil engineering functions of the Government will be placed under one head and that the Department of the Interior will be divided into two divisions, one of public domain, and one of public works. In the latter division will be assembled almost all the governmental activities that the engineers have advocated should go into a Department of Public Works.

Members of the Federation's Registration Committee and Executive Board have taken active part in hearings and appeared before legislative committees dealing with the registration of engineers, exercising their influence to have a uniform law passed.

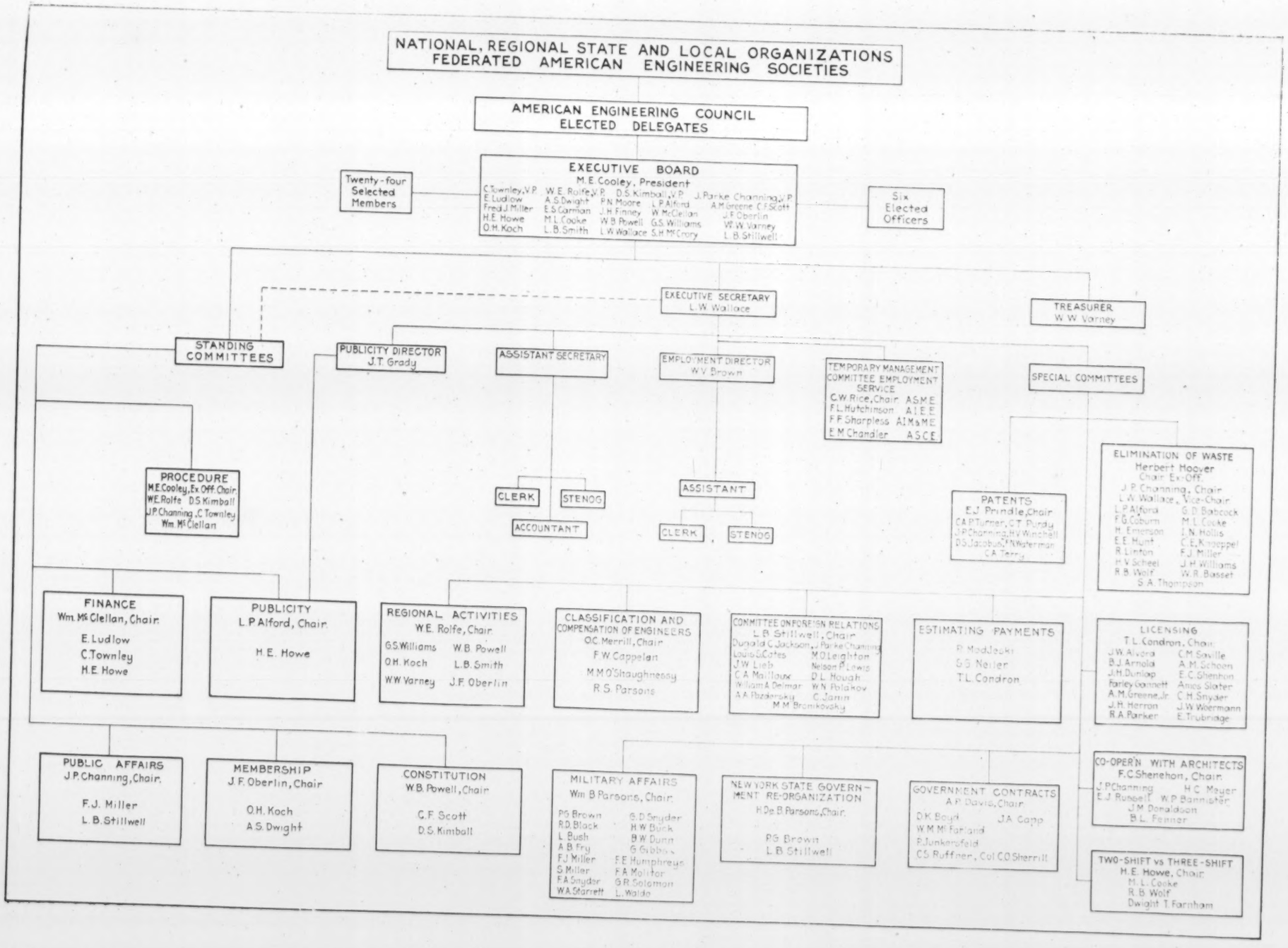
The Federation has maintained an employment bureau in New York and has coöperated with various agencies of similar intent in an effort to reduce unemployment. Recent action was reported in the November issue of MECHANICAL ENGINEERING.

Among other undertakings in which committees and representatives of the Federation have assisted are the following:

Classification and Compensation of Engineers
National Board of Jurisdictional Awards in the Building Industry
New York State Government Reorganization
Types of Government Contracts
Length of Shifts in Continuous Industry.

As a means of distributing information concerning the activities of the Federation, a weekly digest has been issued to engineering organizations, colleges, government offices, and individuals. Over 1400 of these are now being sent out weekly. While Congress is in session weekly digests on legislative and departmental news are also issued to those desiring them. Over 400 stories have been sent out to the press by the publicity director since January 1, and the major waste stories have had a circulation each of at least 14,000,000. The state administrative committees to be organized will be a further means of publicity and closer contact with individual engineers.

The chief objective of the Federation for the next few months will be to solidify its membership. It is realized that the individual engineer is not thoroughly acquainted with the purposes and activities of the Federation. Until engineers in general are more fully informed, the F.A.E.S. cannot hope to function to the best advantage. Arrangements are therefore being made to have some member of the Executive Board appear before every member society during the next two months, bringing to the individual engineer of each society the thought that the purpose of the Federation is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to enable him to render the public service that his training and experience affords.

The Committee on Regional Activities has recommended that the number of districts be increased from 6 to 8; in arranging these districts unity of local interest will be the paramount object.

The Executive Board for 1922 will be composed of 30 members, 16 representatives from national societies, 8 regional directors through which local societies will be represented, and 6 elected officers.

The next meeting of the American Engineering Council will be held at Washington, January 5 and 6, 1922. It will mark a new chapter in the history of the organization. With its plans of organization largely disposed of, the experience of a year back of it, and its work guided by a most efficient personnel, the Federation need not be apprehensive of the future.

The Waste Report

On October 20, 1921, The Federated American Engineering Societies issued printed copies of the report of the Committee on Elimination of Waste in Industry. This book of over four hundred pages contains the reports of a committee of engineers on their investigations of the building industry, men's clothing manufacturing, shoe manufacturing, printing, metal trades and textile manufacturing, as well as general reports on unemployment, strikes and lockouts, legal machinery for adjusting disputes, industrial accidents, health of industrial workers, eye conservation and purchasing and sales policies.

These reports are preceded by a summary which shows sources and causes of wastes and gives recommendations for the elimination of waste. The questionnaire and valuation sheet used by the field engineers in collecting information on which they based their reports are also explained in detail. Each of the engineers' field reports contains the evaluation sheet for the plant investigated.

The foreword by Herbert Hoover sums up the purpose and character of the book:

> This reconnaisance report on waste in industry is the result of five months of intensive study, carefully planned and rapidly executed. A part of its value lies in the speed with which the work has been done, and the promptness with which it presents definite lines for future action. It reveals facts which may serve as a foundation for an advance in American industry. It has a special message for government officials, financial, industrial and commercial leaders, labor organizations, economists, engineers and research groups, the general public and the press.
>
> We have probably the highest ingenuity and efficiency in the operation of our industries of any nation. Yet our industrial machine is far from perfect. The wastes of unemployment during depressions; from speculation and overproduction in booms; from labor turnover; from labor conflicts, from intermittent failure of transportation of supplies of fuel and power; from excessive seasonal operation; from lack of standardization; from loss in our processed and materials—all combine to represent a huge deduction from the goods and services that we might all enjoy if we could do a better job of it.

Section I of the report, which summarized the findings of the Committee, was abstracted in the September issue of MECHANICAL ENGINEERING. The entire report will be reviewed in greater detail in the January issue. The book is on sale through the McGraw-Hill Book Co., Inc., New York.

The Financing and Managing of Large Undertakings

Problems of Raising Money and Choosing Leaders Considered by Joint Meeting of New York Sections of the Four National Engineering Societies

A NOTABLE scheme of coöperative meetings has been developed by the New York Sections of the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Institute of Electrical Engineers and The American Society of Mechanical Engineers. Topics of interest to the entire engineering profession will be presented at four joint meetings during the fall and winter. The first meeting, devoted to the subject The Engineer in Finance and Management, was held October 19 in the Engineering Societies Building and the subject and speakers drew an audience that filled the auditorium to capacity.

Farley Osgood, chairman of the New York Section of the American Institute of Electrical Engineers, presided and introduced as the first speaker Mr. Arthur B. Leach of the A. B. Leach Company, whose subject was The Financing of Large Engineering Undertakings.

The Financing of Large Undertakings

In his opening remarks Mr. Leach emphasized the principle that individuals and the country as a whole are subject to and limited by environment. The country storekeeper cannot hope to do the business of a Wanamaker, so when considering the important subject of the financing of great developments, environment must be faced, and the speaker proceeded to portray present conditions which limit the financing of engineering projects.

As a basis for his picture of present-day limitations, Mr. Leach quoted as follows from a magazine article printed in 1914:

> The year 1914 has marked a culmination of the area of high finance which set in over fifteen years ago. Practically all the "bubbles" growing out of that extraordinary period have now burst and security values as a whole have returned to approximate bases of actual values.
>
> Public opinion, which for ten years has generally been antagonistic to corporate interests, this antagonism naturally growing out of the high-finance policy, has now definitely veered and the pendulum is about to swing the other way. The Federal Reserve Banking System has for the first time in history given legitimate business opportunity a firm basis on which to build, and has eliminated all dangers of financial panic of the style of 1873 and 1907.

Since 1914 the per capita debt in the United States has grown from $9.63 to $224.81, in Great Britain from $75.03 to $814.08, and in other European countries in a similar manner. Money rates have advanced since 1914 from 3 5/8 to 6 3/8 per cent for call money and from 4 7/8 to 7 1/8 per cent for time money, a fact that must be faced in determining the wisdom of financing an enterprise.

Mr. Leach stated that an estimate of tonnage now afloat indicates a total in excess of 60,000,000 gross tons, approximately 11,000,000 gross tons over the figure for June 30, 1914. This condition coupled with a lessened volume of international trade has forced shipping rates to unprofitable levels, with the resultant tying up of great sums of money.

In discussing the financing of railroads, Mr. Leach enunciated the axiom that it was necessary for an enterprise to be reasonably profitable, and pointed out that the investment return in railroads had dropped from 5.68 per cent for the year ending June 30, 1910, to 3.68 per cent for the year ending December 31, 1918, and to 0.78 per cent for the year ending December 31, 1920.

Ohio needs $118,000,000 for its public utilities and 170,000 new homes for 850,000 people, but Mr. Leach showed that for every dollar earned in Ohio ten cents is taken in local taxes. In New York City the stock watering of the rapid-transit companies upon their combination many years ago caused a loss of public confidence which has never been regained. In the operation of street railways, Mr. Leach showed that recent increases in fares have brought about considerable improvement.

Quoting Abraham Lincoln, who said that "public sentiment is everything, with it nothing can fail, without it nothing can succeed," Mr. Leach made the plea that greater publicity be given by public-utility managers.

The large foreign loans at high rates of interest have also rendered domestic financing more difficult. Foreign governments need money and are willing to pay for it at rates that domestic enterprises cannot meet.

Mr. Leach pointed to the exceedingly low wage rates in Germany as a vital reason for developing every per cent of usefulness in our present industrial installations to protect us from an overwhelming influx of foreign goods. He pointed out the case of the Government expenditure of $72,000,000 for a powder plant at Nitro, W. Va., and emphasized the need for the determination of the most economic use of the development.

Mr. Leach summed up his thesis in the following words:

As money is released from shipping, from foreign credits, and from business enterprises which have been overdeveloped, a surplus will come, and then the market place will have funds for the development of new enterprises. But first, we must make all of our operations efficient, we must get down to a basis where we can compete with foreigners, who are going to ship large quantities of goods here on account of the low prices of labor abroad. We must make efficient and economic in their operation these great plants which the Government or individuals built under wartime pressure; because in all of our operations of an industrial or commercial or a financial character, we must aim to be efficient in as high a degree as we can. Before any new enterprises can be started and completed, we must force home to the public what was coming to be true in 1914, we must get rid of this antagonism for new development, and we must make common among all of the people the belief that these enterprises are for the common good, and for the good of everybody.

If we are to get to the place where great financial plans can be carried out, we must not lose time being glad that the other fellow has had a devil of a time in the last three or four years, but we must spend more time trying to work out these problems that the war has left on our hands, so that we shall get back to a normal basis of mutual confidence, or mutual belief that this country is going ahead, and that we are going to be able to build again that temple which our fathers started, and which has been stopped by this crisis of world fury and world hate.

THE ENGINEER'S SHORTCOMINGS AS A FINANCIAL MANAGER

The Chairman then introduced Philip Cabot, of Boston, a member of the firm of White, Weld and Company, who spoke on the subject The Engineer a Failure as a Financial Manager. His remarks were in part as follows:

Essentially the great engineer as born and trained in our times is of the scientific, studious type, disciplined, severe, ascetic by nature and by training in the schools and in life.

Your builder and leader of great industrial enterprises is cast in a different mold. He is essentially an idealist, imaginative, enthusiastic, impulsive intensely human, a dreamer of dreams with the power to make the dreams come true. In short, an artist capable both of great imaginative conception, and fine technical execution; possessed of the power both to conceive and do.

A glance at the history of American industry during the last fifty years will show that the great figures are all men of this type; Vanderbilt, Hill, Ripley, Carnegie, Schwab, Rosenwald, Woolworth, Armour, McCormick, McElwain, Endicott, Ford, Westinghouse, Coffin, Vail. As one example, take Vail, of the telephone company. Distinctly less remarkable than some of his predecessors in intellectual power, and scientific training, he took the company when to some of us it seemed about to go upon the financial rocks and left it the most shining success of any public utility in the world. His success was due, not to commanding intelligence but to imaginative power and the capacity to select and direct men.

And look at our dear Henry Ford with all his sins of ignorance upon his head, who has, as it were, over night leaped from nowhere into the multimillionaire class, leading an automobile industry as large in some dimensions as all others in the country put together, and perhaps the one successful one.

The reason why such men succeed is obvious. They have faith; they believe in things they cannot prove, possess the courage to stake their reputation and their future on their ability to make their dreams come true, and obtained from these qualities the power to inspire with enthusiasm and loyalty the great body of men under their command who are their necessary tools, controlling them with the precision and power with which the great painter handles his brush.

Such a spirit in an organization is an essential (one is tempted to say *the one* essential) of industrial, as of military, success; unquestioning loyalty and the willingness to take desperate chances at the word of command. Leadership in any field demands this type of man, this power to inspire. With it success will come in spite of many weaknesses. Without it success will be difficult except for commanding genius.

The foregoing are examples of shining success and the reasons for it. But we learn more, as a rule, from our failures, and it will be instructive to note some of these. Perhaps the most striking illustration of failure which we have today is the railroad business. The present condition of these public utilities contrasts very sharply with the condition of the telephone company as it grew under the leadership of Mr. Vail. Many reasons are assigned for the collapse of the railroads, and like all other human things, there is doubtless no one cause, the result being the product of many causes. But it is very striking to note the change in the type of men who now lead the great railroad systems, as compared with the men who led them when they were successful. Formerly the railroad leaders were traffic men and salesmen and builders, today the railroads are run by operating men, engineers, and the traffic men have been pushed aside. The failure of the railway executives to meet the demands of the times is not exactly their fault. They have been subject to state regulations and federal regulations, which has put them under an impossible handicap. They have the nominal position of responsibility without power, and no wonder they fail in successful leadership, but it is inevitable that they should fail. The huge army which these men command, far from being inspired by the enthusiasm and loyalty which are essential to success, is admittedly upon the verge of mutiny. For years the relation of the great railroad executives to their employees has been such as to breed disloyalty. The effect of Government regulation as designed and administered during the last twenty years has been to develop in railway executives and in leaders of the great railway unions the most conspicuous and magnificent example which the world has ever seen of the great game of "Anti" and "pass the buck."

I do not say, nor do I believe, that it is impossible for an engineer to be a great leader and manager of industry. All that I maintain is that his natural handicap is increased by our present methods of training to such an extent as to make him an unpromising candidate for promotion to such positions, and I say this with full knowledge of the fact that his selection to fill them has become increasingly common of late years, especially in public-service corporations.

If this fact seems to you extraordinary the reason is not far to seek. The directors and officers of corporations are in theory elected by the owners, (to wit, the stockholders) but nothing is further from the fact. Stockholders are in practice a flock of sheep incapable of concerted, intelligent action, but eager to follow any leader, so that the task of selecting corporation managements falls upon the banker, or financial godfather of the enterprise. Such men, cautious by nature, and made doubly so by experience, yearn for a sure thing and welcome the engineer with his mathematical accuracy. Your engineer at least will not exceed his estimates, will tell them in advance what he will do and do it, while your most visionary promoter must forever be watched and guided. With an engineer at the wheel the company will run itself and the banker and director can sleep in peace. At least he thinks so, and for a time he can. But there is apt to be a rude awakening when he discovers that the business has gradually evaporated, wages have shown a disconcerting tendency to eat up profits, and customers are becoming surly.

In this case, as in all others, the search for the sure thing fails; temporary peace is purchased at the cost of ultimate failure, and the practice must be abandoned. The bankers must select men of enthusiasm, courage and vision and must put over them boards of directors who are capable and willing to direct. Your dreamer without direction will wreck you faster and more certainly than your man of science. But with adequate direction and control he is your safest man, and if our engineers are to occupy such positions with success their education and training must be profoundly modified.

The great builders and leaders of large industries in the United States have all possessed the following qualities:

1 Imagination, giving
   - *a* The power to see with remarkable clearness the customer of the market
   - *b* Power of leadership, the ability to inspire loyalty and enthusiasm in subordinates
   - *c* Judgment of men; the ability to pick subordinates of power.

2 Administrative ability, technique, the power to use tools—to do work through others.

These qualities are essential because large industries involve the use of large bodies of men who must be led and cannot be driven. They must be always kept growing, which requires vision of the changing conditions of the market; the promotion stage is never over.

I am not an engineer, but have known engineers and have lived with them, slept with them, have worked with them, and I admire them. They are great men, but as we train our engineers today, we handicap them as managers. If they are to be great managers, you have got to modify their training.

John H. Williams, consulting engineer, of Philadelphia, commented on the development by Mr. Leach of the need for the thoughtful type and by Mr. Cabot for the enthusiastic, and stated as his opinion that the need was for a man whose one great characteristic is flexibility. Mr. Williams in commenting on Mr. Cabot's analysis of the failure of the railroad men because of their responsibility without authority pointed out that an ability to enforce judgments peacefully was of greater value than authority.

Calvert Townley, vice-president of the Westinghouse Electric and Manufacturing Company, discussed the recent change in conception of an engineer's function. He pointed out that the reason for the growing demand for engineers is because engineering training leads to the search for facts and conclusions based on these facts. The engineer attacks the problem from the quantitative rather than the qualitative point of view. Mr. Townley stated as his opinion that the position of the railroads today is due to the former promoters whose broad vision was not bounded by facts and figures.

Lewis H. Nash expressed his approval of the discussion of finance by engineers. He emphasized the importance of a knowledge of finance by the engineer as the primary part of any enterprise. Inasmuch as the engineer is by education particularly fitted to look upon an enterprise from the point of view of efficiency, it is his duty to see that the best materials and the best devices are selected for the purposes desired and that the costs are reasonable. It is his duty to supervise the handling and distribution costs. From his point of view finance is one of the tools to be used and the engineer is by education and temperament particularly fitted to have charge of the finance of an honest enterprise.

Abraham Korminsky and Blamey Stevens emphasized the important function of the engineer in straightening out the kinks in present condition of affairs, not only by developing proper effectiveness of our industries but also by taking part in the careful analysis of general business conditions.

NEWS OF OTHER SOCIETIES

National Safety Council

According to figures contained in resolutions adopted by the National Safety Council at the Tenth Annual Safety Congress, held in Boston, Mass., Sept. 26, some 80,000 accidental deaths and millions of injuries occur annually. National experience has demonstrated that 75 per cent of industrial accidents are preventable. Experimental campaigns in seven cities have resulted in the reduction of public accidents by 25 to 40 per cent and further efforts it is stated, will undoubtedly result in even greater progress. The direct economic cost of accidents in industry alone exceeds one billion dollars annually and greater indirect losses are caused by the curtailment of production and lowering of morale. The National Safety Council advocates the safeguarding of all dangerous machinery and places, the redesigning and reconstruction of factory equipment when necessary, the education of all workmen and their supervisors in safe methods and habits of work, safety education of school children and of college and university students, and the mobilization of all community forces for intensive and permanent campaigns against accidents of all types.

At a meeting of the Executive Committee of the Council, the organization of a Drop Forge Section and a Petroleum Section to conduct accident prevention in these industries was approved.

W. H. Cameron, formerly secretary-treasurer of the National Workmen Compensation Service Bureau, New York City, was elected executive secretary of the Council.

Society of Industrial Engineers

The fall convention of the Society of Industrial Engineers was held at Springfield, Mass., Oct. 5 to 7. The leading topic of the meeting was Industrial Stability, and sectional meetings dealt with the sub-topics of education, manufacturing and selling, financing and accounting, and industrial relations.

L. W. Wallace, president of the society, and executive secretary of The Federated American Engineering Societies, opened the meeting with a discussion of the chief causes of industrial unsettlement. F. M. Feiker, assistant to Secretary of Commerce Hoover, spoke of the need of a barometer of business analogous to the Weather Bureau. At an evening session the first day of the meeting, E. St. Elmo Lewis, of New York, gave an interesting address on Setting Sales Standards.

Among the speakers on the second day were Dr. Ira N. Hollis, of Worcester Polytechnic Institute, on harmonious relations between factory owners, managements and employees; Arthur T. Davenport, of Sweet, Orr & Co., New York, on The Importance to the Factory of Constant Output, and Harry A. Hopf, organization counsel for the Federal Reserve Bank of New York, on Standardization of Salaries of Administrative Employees.

At a meeting on Friday afternoon Robert B. Wolf, of New York, discussed The Elimination of Waste in Industry by Standardization, and Frank B. Gilbreth, of Montclair, N. J., spoke on Standardization of the Task.

The speakers at the final session Friday evening were Reuben A. Lundquist, chief of the electrical division of the Federal Department of Commerce, who dealt with The Influence of Foreign Trade on Industrial Stability, and Floyd Parsons, of Philadelphia, who discussed the education of the public for industrial stability.

Inspection trips were made to the principal manufacturing plants of Springfield and vicinity.

Officers of the Society for 1922 were elected as follows: President, Joseph W. Roe, head of the industrial engineering department of New York University; treasurer, F. C. Schwedtman, vice-president National City Bank, New York; secretary, W. G. Sheehan, Detroit; and business manager, George C. Dent, Chicago.

American Gear Manufacturers' Association

At the semi-annual meeting of the American Gear Manufacturers' Association held at Rochester, N. Y., Oct. 13, 14, and 15, reports of committees carrying on special investigations were heard and discussed, some standards were adopted as recommended practices, and definite steps were taken by committees toward coöperative work with standardization bodies of such organizations as the American Society for Testing Materials, The American Society of Mechanical Engineers, and the Society of Automotive Engineers, all of which organizations are working under the Rules of the American Engineering Standards Committee. Sessions at which committee reports were presented were opened with the reading of papers, the majority of which dealt with gear-making problems. Among the speakers were S. O. White, chief engineer of the Warner Gear Co., Muncie, Ind., R. W. Daniels of the Baush Machine Tool Co., Springfield, Mass., and E. W. Miller, chief engineer of the Fellows Gear Shaper Co., Springfield, Vt. E. S. Sawtelle, assistant general manager of the Tool Steel Gear & Pinion Co., Cincinnati, told of his experiences and observations in a recent European trip.

The results of a questionnaire sent to the membership by the Committee on Uniform Cost Accounting are of interest. Nearly 55 per sent of the 44 companies replying stated that they were in favor of the committee's classification of accounts. The machine-hour rate of distributing the factory overhead expenses is employed by 16 of the companies and one percentage of direct labor for the entire plant is in use in 14 companies. In the distribution of administrative, general and selling expenses to costs apply a percentage of the factory costs while seven combine these expenses with the shop overhead and make the distribution as a percentage if the direct labor. The committee is of the opinion that the shop overhead expenses should be distributed to machines, groups of machines or manufacturing departments and that such expenses as special tools and patterns should be charged direct to the job for which they are made or purchased. The committee recommended that commercial expenses be distributed on a percentage of factory cost basis.

The report of the Herringbone Gear Sub-Committee on a recommended practice providing for tooth calculation on the basis of diametral pitch in the plane of rotation was approved. However, it is not likely that this practice will be broadly followed until the committee has submitted recommendations to make it possible for gear makers to use certain standard stock hobs in cutting according to the new standard.

An interesting feature of the meeting was an inspection trip to the Gleason Works, where a number of new machines were seen in operation.

National Machine Tool Builders' Association

The National Machine Tool Builders' Association held its annual meeting in New York City, October 18, 19 and 20. In his report August H. Tuechter, president, reviewed the history of the association, and discussed the general lines of work which he believed it should follow.

The report of the general manager, Ernest F. DuBrul, dealt with association activities in general, with particular reference to statistical service, giving suggestions for the improvement of the business-barometer charts which the association has been issuing every month.

Mr. DuBrul, Prof. David F. Jordan of New York University, and C. L. Cameron of Gould & Eberhardt, Newark, N. J., discussed business cycles, especially as affecting machine-tool builders. Hon. Charles L. Underhill, congressman from Massachusetts, spoke on the subject of How Present Political Policies Affect Business.

W. H. Rastall, chief of the Industrial Machinery Division, U. S. Dept. of Commerce, and J. H. Drury, treasurer, Union Twist Drill Co., Athol, Mass., told of the conditions in the machine-tool industry in the Orient and in Europe, respectively. J. E. Andress, secretary, Barnes Drill Co., Rockford, Ill., discussed the granting of long-term credit with proper guarantees or insurance in foreign trade.

H. L. Flather, treasurer, Flather & Co., Inc., Nashua, N. H., discussed the possibility of utilizing machine-tool plants during slack times, and E. M. Brotherhood, vice-president, Manning, Maxwell & Moore, Inc., New York, expressed his opinion on the possibilities of reduction in the cost of machine tools in 1922.

Mr. Teuchter will continue to serve as president, and Mr. DuBrul as general manager; H. W. Dunbar, sales manager, the Norton Company, Worcester, Mass., was elected secretary to succeed Carl F. Dietz, resigned. The next Spring Convention will be held at Atlantic City.

(Continued on page 836)

LIBRARY NOTES AND BOOK REVIEWS

Economics of Bridgework

ECONOMICS OF BRIDGEWORK. By Dr. J. A. L. Waddell. John Wiley & Sons, Inc., New York, 1921. Cloth, 6×9 in. 512 pp., illus., $6.

Although written primarily for bridge specialists, as the author informs us, this book is not unworthy of some consideration by the mechanical engineer, for of the forty-five chapters at least twelve are of wider application than may have been intended in their conception. Economics of Bridgework may be read with profit by the electrical and mechanical as well as the civil engineer.

There is much food for thought and doubtless for experimentation in the chapter on alloy steels. Some of the data given seem fairly well substantiated, others are more or less problematical and require the corroboration of actual analysis.

The names chosen for some of the proposed alloys are weird to say the least, "chrovanmol," "nichro," etc., reminding one of the "Jabberwock" of Alice's Adventures; but if an alloy of chromium vanadium and molybdenum can be commercially produced to develop without heat treatment and without excessive cost, the characteristics assigned to it by the author, among them 170,000 lb. elastic limit, it should make great changes in the weights of engineering structures, and we can forgive it its name.

As the author himself says, his chapter dealing with the economics of operating machinery and power is "limited to a dissertation covering general conditions and the offering of a few pertinent suggestions." Among the latter a few are particularly worthy of note.

The author highly recommends as his ideal apparatus "two high-speed gas engines each with hydraulic transmission gear and worm gear, the two engines together sufficient to operate the bridge at maximum required speed, and one alone (by means of the hydraulic reducing gear) capable of running it at a slower speed." It would appear that there should be a field for such apparatus but that the use of the worm drive should be limited to fairly small units, operating at sufficiently high speed to allow of a reasonably efficient worm design. Where electric power is not available, the gas engine seems to offer the best source of power, but the control features possible with the former, such as limit switches, interlocks, etc., while perhaps not impossible with the latter, are certainly not so elastic of application or so practicable.

In closing his chapter on Economics of Operating Machinery, the author justly criticises a practice among engineers of covering the design of the machinery for movable bridges by a general specification not necessarily applicable to the specific case in hand, thus producing mechanism far too heavy for actual needs. He refers to the requirement that brakes on bascule spans be designed to resist a wind of fifteen or twenty pounds per square foot on the area of the open leaf in cases where no such condition is at all likely to exist due to protection from surrounding hills, and without any allowance for increase in unit stresses for such a condition. This point is certainly very well taken.

The book is full of good suggestions and is a fitting supplement to the author's monumental work, Bridge Engineering.—H. P. VAN C.

ANALYTICAL MECHANICS FOR ENGINEERS. By Fred B. Seely and Newton E. Ensign. John Wiley & Sons, Inc., New York, 1921. Cloth, 6×9 in., 486 pp., diagrams, $4.

The aim in this book has been to make the principles of mechanics stand out clearly, to build them up as much as possible from common experience, to apply the principles to concrete problems of practical value, and to emphasize the physical rather than the mathematical interpretation of them. Statics, kinematics and kinetics are included, the two latter being developed with regard for the increasing importance of dynamics to engineers. The treatment of kinetics, while extensive, has been restricted to the more common types of motion found in engineering practice.

BERICHTE UND ABHANDLUNGEN DER WISSENSCHAFTLICHEN GESELLSCHAFT FUR LUFTFAHRT. (Beihefte zur "Zeitschrift Flugtechnik und Motorluftschiffahrt.") R. Oldenbourg, Munich, 1921. Paper, 9×12 in., 81 pp., illus., 32 marks.

This supplement contains the proceedings of the sixth meeting of the Society, at Charlottenburg, October 15, 1920. In addition to the official actions of the meeting, it contains the technical papers presented, which treat of the relation between the design of power plants for aircraft and safety in flight. The results of research in aerology and atmospheric electricity by flights, the formation of eddies by planes and advances in space telegraphy and telephony.

CHEMICAL AND METALLOGRAPHIC EXAMINATION OF IRON, STEEL AND BRASS. By William T. Hall and Robert S. Williams. First edition McGraw-Hill Book Co., Inc., New York, 1921. Cloth, 5×8 in. 501 pp., illus., $5.

This work is divided into two parts. The first gives a careful selection of methods for the chemical analysis of iron and steel, brass and bronze. Special attention is given to explanation of the chemical reactions involved in the methods given and to the discussion of their accuracy. Emphasis is placed on those that are both accurate and rapid. Part two considers the physical inspection of metals. In it the methods for preparing and examining polished surfaces are described. A brief introduction to metallography, as applied to the inspection of alloys, is included.

DRAWING ROOM PRACTICE. By Frank A. Stanley. First edition. McGraw-Hill Book Co., Inc., New York, 1921. Cloth, 6×9 in., 253 pp., illus., $2.50.

This book deals with the making of drawings, from the simplest constructions to complete assembly and working drawings of various classes. It is based on experience in a number of leading American and European drawing rooms, and in teaching students. The difficulty in visualizing the work represented by a drawing, which many students undergo, has led the author to present photographs of the objects represented by the working drawings discussed in the book.

ECONOMIC ASPECTS OF THE GREAT LAKES-ST. LAWRENCE SHIP CHANNEL. By Roy S. MacElwee, Alfred H. Ritter. The Ronald Press Co., New York, 1921. Cloth, 6×9 in., 291 pp., maps, tables, $4.

This work is a study of the local and national advantages to be gained from opening the Great Lakes to ocean traffic. It attempts to coördinate the information on the commercial and economic aspects of the proposed ship channel, as presented at the hearings held throughout the country by the International Joint Commission and to present the vital facts affecting the advisability of the construction of the proposed improvement.

GRINDING MACHINES AND THEIR USE. By Thos. R. Shaw. Sir Isaac Pitman & Sons, Ltd., London and New York, 1921. (Technical primer series.) Cloth, 4×6 in., 114 pp., illus., $0.85.

A concise review of the main principles of workshop precision grinding, based on long experience in the design and construction of grinding machines and close observation of their utility. Suitable as an introduction to the subject.

MANHOOD OF HUMANITY. By Alfred Korzybski. E. P. Dutton & Co., New York, 1921. Cloth, 6 × 8 in., 264 pp., $3.

This book is primarily a study of man and ultimately embraces all the great qualities and problems of man. The author approaches the problem from a mathematical, an engineering, point of view, with the object of ascertaining what man's real nature is and what the basic laws of his nature are, and hopes thus to point the way to a science of directing human energies and capacities to the advancement of human welfare.

THE MECHANICAL PRODUCTION OF COLD. By Sir J. A. Ewing. Second edition. University Press, Cambridge, 1921. Cloth, 6 × 9 in., 204 pp., diagrams, $8. (Gift of The Macmillan Co., N. Y.)

This book contains the "Howard" Lectures delivered before the Society of Arts in 1897, as revised and reprinted in 1908. It provides a general account of refrigeration, in which stress is laid on the thermodynamic aspect of the subject, and an attempt is made to render this aspect intelligible without unnecessary mathematics.

The changes in this edition are the correction of certain errata and the clearing up of some obscure points.

MECHANICS. By James E. Boyd. First edition. McGraw-Hill Book Co., Inc., New York, 1921. Cloth, 6 × 9 in., 417 pp., diagrms., $3.50

Intended to give a working knowledge of the principles of mechanics and to supply a foundation upon which intelligent study of the strength of materials, stresses in structures, machine design and other more technical courses may rest. In the development of the subject, emphasis is put upon the physical character of the ideas expressed.

MECHANISM. By Robert McArdle. McGraw-Hill Book Co., Inc., New York, 1921. Cloth, 6 × 9 in., 173 pp., illus., diagrms., $2.25.

A brief course for students of engineering. Commences with a short discussion of motions and velocities, which is followed by a study of linkages, cams, gearing, belting and intermittent motions. In this revision difficult points have been made clearer and many problems have been added.

MODERN BUILDING SUPERINTENDENCE AND THE WRITING OF SPECIFICATIONS. By David B. Emerson. Charles Scribner's Sons, New York, 1921. Cloth, 4 × 7 in., 247 pp., $1.75.

This volume is intended to aid the young engineer in superintending construction and in writing building specifications. The author outlines, step by step, the duties of the superintendent during the erection of a typical modern twenty-story office building, calling attention to the matters that must be watched. In similar fashion, he outlines the proper procedure in writing specifications for a small dwelling.

MODERN CENTRAL STATIONS. By Charles W. Marshall. Sir Isaac Pitman & Sons, Ltd., London and New York, 1921. (Technical primer series.) Cloth, 4 × 6 in., 115 pp., illus., $0.85.

A brief description of the principal features of British central-station practice, intended for young engineers. Includes the coal- and ash-handling plant, boiler house, engine room, switch and protective gear, plant operation and testing.

OIL FLOW IN PIPE LINES. By R. S. Danforth. King Knight Co., San Francisco, 1921. Paper, 9 × 12 in., 12 pp., charts, $3.

These charts have been compiled to facilitate the solution of problems in oil pumping. They are derived from the formulas and method of computation used by the author in his monograph entitled Friction Losses in Oil Pipe Lines and are based on the law of the flow of liquids in pipe lines deduced at the National Physical Laboratory of Great Britain. The charts will apply to the flow of any liquid or gas in cases where the inside surface of the pipe is of the roughness ordinarily found in oil-pipe lines.

THE ORIFICE METER AND GAS MEASUREMENT. By Willis C. Brown and Malcolm B. Hall. The Foxboro Co., Inc., Foxboro, Mass., 1921. Cloth 5 × 8 in., 112 pp., tables, illus., $3.50.

This book, published by the manufactures of the first commercial orifice meter, gives authentic information on orifice coefficients and their derivation, together with complete details of the mechanical construction of their own meter.

POWER HOUSE DESIGN. By Sir John F. C. Snell. Second edition. Longmans, Green & Co., New York, 1921. (Electrical engineering series.) Cloth, 6 × 9 in., 535 pp., illus., diagrams, tables, $14.

In preparing this book, the author has drawn upon his own experience of over twenty years and has collected and classified the experience of other engineers. The information thus acquired has been carefully sifted and condensed in the present volume, which the writer believes to contain all the requisite practical information on its subject. The principles and information given cover the design and equipment of central stations and isolated plants for supplying light and power to cities, factories, mines, railroads, etc., and are accompanied by typical examples of modern installations. This edition has been thoroughly revised and to a considerable extent rewritten

PNEUMATIC CONVEYING. By E. G. Phillips. Sir Isaac Pitman & Sons, Ltd., London and New York, 1921. (Technical primer series.) Cloth, 4 × 6 in., 108 pp., illus., $0.85.

A general survey of the information available on machinery and methods form handling coal, ashes, grain and other heavy solids, with brief references to air-lift pumping, vacuum cleaning, etc.

WIRTSCHAFTLICHES SCHLEIFEN. Compiled by G. Schlesinger. Julius Springer, Berlin, 1921. Paper, 9 × 12 in., 103 pp., illus., 24 M.

A collection of essays on grinding machines and processes, based on German and American shop practice, and intended to call attention to the advantages of grinding, its use for various purposes, the machines employed, and the methods used. The articles first appeared in Vols. 11 to 15 of *Werkstattstechnik*.

NEWS OF OTHER SOCIETIES

(*Continued from page 834*)

INDUSTRIAL RELATIONS CONFERENCE

An industrial relations conference was held at Harrisburg, Pa., Oct. 24–27, under the auspices of the Pennsylvania State Department of Labor. Among the speakers were L. W. Wallace, executive secretary of American Engineering Council, representing The Federated American Engineering Societies, who discussed industrial waste from the standpoint of unemployment, and Dr. John M. Thomas, president of Pennsylvania State College, who dealt with industrial education in college and university.

INDUSTRIAL RELATIONS ASSOCIATION OF AMERICA

The annual convention of the Industrial Relations Association of America was held in New York City November 1–4, 1921. During the first three days there were a number of important round-table discussions, and sectional meetings dealing with some of the problems of the various industries in handling personnel. Business conditions, the basic principles of sound employment practice, department costs, fundamental principles of human relations in industry, unemployment, essential labor statistics and their uses, and determination of wage rates were among subjects discussed at other sessions. Magnus W. Alexander, managing director of the National Industrial Conference Board, George E. Roberts, vice-president of the National City Bank, W. H. Nichols, Jr., president of the General Chemical Company, C. R. Dooley and C. J. Hicks, of the Standard Oil Company, E. B. Merriam, director of industrial relations of the General Electric Company, and Loyall A. Osborne, president of the Westinghouse Electric Company, were among the speakers at these sessions.

The last two days of the convention were held in conjunction with the Academy of Political Science. There were five main sessions, three on Nov. 4 and two on Nov. 5. The first two considered the subjects of personnel work and coöperation within industrial plants and industry-wide coöperation.

One of the most important of these joint sessions was that held on Friday evening, Nov. 4, dealing with good-will and coöperation in industry. The presiding officer was Herbert Hoover, who called attention to the growing tendency on the part of the public to demand that its interests be heard in the settlement of strikes, and emphasized the importance of making such demands in a way which will secure good-will as well as justice. B. Seebohm Rowntree, York, England, discussed conditions essential to industrial coöperation from a British employer's point of view, while Hugh Frayne, general organizer, American Federation of Labor, dealt with the worker's point of view. Industrial coöperation in Canada was the subject of an address by Hon. G. C. Robertson, Minister of Labor, Ottawa, Canada. Secretary of Labor Davis, in an address on government counselors and efforts to promote coöperation, stated as his belief that the living wage was not enough and that the country is benefited if its workmen are able to save.

The two sessions on Nov. 5 covered industrial relations in governmental employment and in financial institutions, and governmental and other organized counsel for the better promotion of industrial relations. Personnel work in the Post Office Department, Rock Island Arsenal, prisons and state institutions, Federal Civil Service, and financial institutions were considered at the first of these sessions. At the second, Alexander C. Brown, president of the Brown Hoisting Machinery Co., Cleveland, and president of Cleveland Chamber of Commerce, discussed the part of the chamber of commerce in promoting better industrial relations, and D. S. Kimball, dean of the College of Engineering, Cornell University, president-elect, A.S.M.E., the part of the universities and technical schools. Other speakers outlined specific work being carried on in Philadelphia and New York.

THE ENGINEERING INDEX

(Registered U. S. Patent Office and Canadian Patent Office.)

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

Photostatic copies (white printing on a black background) of any of the articles listed in the Index may be obtained at a price of 25 cents per page, plus postage. A separate print is required for each page of the larger periodicals, but wherever possible two small or medium-sized pages will be photographed together on the same print. The bill will be mailed with the print. When ordering photostats identify the article by quoting from the Index item: (1) Title of article; (2) Name of periodical in which it appeared; (3) Volume, number, and date of publication of periodical; (4) Page numbers. Orders should be sent to the Engineering Societies Library, 29 West 39th Street, New York.

ABRASIVE WHEELS

Selection and Grading. Grinding Wheels, James Shaddock and Alfred Herbert. Eng. Production, vol. 3, no. 48, Sept. 1, 1921, pp. 198-200, 2 figs. Notes on selection and grading. Gives list of wheels suitable for use on Norton machines for external grinding, and on Heald machines for internal grinding.

ACCOUNTING

Power Plants. Power-Plant Accounts—I, II, III, IV and V, Wilfred E. Miller. Power, vol. 54, nos. 11, 12, 13, 14 and 15, Sept. 13, 20, 27, Oct. 4 and 11, 1921, pp. 408-410, 448-451, 489-491, 528-530 and 558-560, 13 figs., Sept. 13: Tells what accounting is and shows how to keep records of labor, fuel, water, lubricants, ash removal, repairs, scale removal, etc. Sept. 20 and 27: Use of journal and ledger. Oct. 4 and 11: Indirect expense.

AERODYNAMICS

Air-Flow Theory. Recent Progress in the Aerodynamic Air-Flow Theory (Die neueren Fortschritte der flugtechnischen Strömungslehre), L. Prandtl. Zeit. des Vereines deutscher Ingenieure, vol. 65, no. 37, Sept. 10, 1921, pp. 959-965, 16 figs. Notes on recent development of hydrodynamic theory of air resistance. Points out that Newton theory is not in accordance with actual behavior. Motion of air resembles that of a volumetrically constant liquid. Most important laws for such flows are presented, and their application to airship bodies and airplane surfaces explained. Tests are said to confirm results of investigation.

AERONAUTICS

Technical Problems. Some Technical Problems in Aeronautics. Mech. Eng., vol. 43, no. 8, Aug. 1921, pp. 526-528 and 562, 8 figs. Aluminum cylinder castings, air-cooled airplane engines, airplane carburetors and radiators, aerial photography, machine-gun synchronizers, etc., as discussed at joint visit of Am. Soc. Mech. Engrs. and Soc. Automotive Engrs. to McCook Field.

AEROPLANE ENGINES

Benz. The 300-hp. Benz Aircraft Engine, A. Heller. Flight, vol. 13, no. 32, August 11, 1921, pp. 537-542, 34 figs. Describes in detail latest type made by Benz & Co. Engine has 12 cylinders of 135 mm. bore and 150 mm. stroke. Trans. from Zeit. des Vereines Deutscher Ingenieure.

Comparative Data. Comparative Aircraft Engine Data. Automotive Industries, vol. 45, no. 10, Sept. 8, 1921, p. 457. Gives figures as to power of engines, compression ratio, fuel consumption, mean effective pressures, weight per hp. working stresses, etc. From La Technique Moderne.

Laboratory Testing. A Laboratory for Aircraft Engine Testing, Herbert Chase. Automotive Industries, vol. 45, no. 11, Sept. 15, 1921, pp. 520-522, 3 figs. Describes laboratory of Wright Aeronautical Corp. and their facilities for testing engines.

Types. Aero Engines, Alan E. L. Chorlton. Jl. Roy. Soc. Arts, vol. 69, no. 3589, Sept. 2, 1921, pp. 689-705, 17 figs. Discusses various types of engines and gives tables of test data of leading engines in 1914, both British war office trials and German aeroplane engine trials.

AEROPLANES

Balancing. The Design of Aeroplane Control Surfaces, with Special Reference to Balancing, H. B. Irving. Aeronautical Jl., vol. 25, no. 130, Oct. 1921, pp. 537-555, 13 figs. Discusses three methods of balancing, all of which have been adopted in varying measure in practice: The "horn" method; "backward hinge" method; and Avro patent method.

Barnhart Twin 15. The Barnhart Twin 15 "Wampus-Kat." Aviation, vol. 11, no. 11, Sept. 2, 1921, pp. 309-311, 2 figs. Airplane built by C. R. Little, 180 hp.; gives data and describes principal features.

Bristol 10-Seater. The "Bristol" Ten-Seater Airplane. Aviation, vol. 11, no. 8, August 22, 1921, pp. 229, 1 fig. Gives dimensions, weights, loading and performance data; 450-hp. Napier engine.

Commercial. The Commercial Airplane, L. B. Lent. Aviation, vol. 11, no. 7, August 15, 1921, pp. 188-189. Discusses speed, carrying capacity, distribution of load, etc.

Handley-Page. The Handley-Page Airplane V 1500 (Das Handley Page-Flugzeug V 1500). Motorwagen, vol. 24, no. 23, Aug. 20, 1921, pp. 474-476, 3 figs. Discusses its salient features and compares it with German machines of similar type.

Helicopters. See HELICOPTERS.

Landing. The Manoeuvres of Getting Off and Landing, R. M. Hill. Aeronautical Jl., vol. 25, no. 130, Oct. 1921, pp. 510-536, 2 figs. Discusses factors influencing getting off and landing, and experiments with mechanical devices to assist landing, such as the Palethorpe tail skid and the Noakes ground indicator.

Safety Factors in Design. Safety Factors in Airplane Design, Alfred S. Niles. Eng. News-Rec., vol. 87, no. 12, Sept. 22, 1921, pp. 490-491. Reasons for adoption of low factors based on abnormal conditions. Successful use of long columns.

Single-Engined Cabin. Single-Engined Cabin Airplanes, Donald W. McIlhiney. Aviation, vol. 11, no. 13, Sept. 26, 1921, pp. 364-365, 1 fig. Includes table giving data concerning forty-two machines of this type.

Struts. Non-Injurious Ultimate-Strength Tests for Interplane Struts, E. R. Maurer. Jl. Soc. Automotive Engrs., vol. 9, no. 3, Sept. 1921, pp. 201-207, 10 figs. Describes direct test by subjecting the strut to ordinary test for maximum load, and indirect test, consisting in making a simple bending test for certain data.

Zeppelin-Staaken. The Monoplane "Zeppelin-Staaken" (Le Monoplan "Zeppelin-Staaken"), E.-H. Lemonon. L'Aerophile, vol. 29, no. 13-14, July 1-15, 1921, pp. 203-208, 12 figs. Gives data of dimensions and tests and describes main features; has 4 Maybach 290-hp. engines.

AIRCRAFT

High-Altitude. High Altitude Aircraft of the Future, C. Eberhardt. Automotive Ind., vol. 45, no. 9, Sept. 1, 1921, pp. 418-420, 3 figs. Discusses possibility of keeping engine output constant at high altitudes. Translated from Der Motorwagen.

AIRCRAFT CONSTRUCTION MATERIALS

Plywood. Making Plywood in South Africa. So. African Jl. of Industries, vol. 4, no. 7, August 1921, pp. 613-618, 5 figs. Discusses preparation of logs, peeling process, gluing of sheets, uses of plywood, etc.

AIRSHIPS

Transatlantic. Airships for a Transatlantic Service, Ralph Upson. Aviation, vol. 11, no. 13, Sept. 26, 1921, pp. 374-376, 1 fig. Discusses advantages and disadvantages and works out average flying data for New York-London routes.

ALCOHOL

Corncobs as Source. A Fermentation Process for the Production of Acetone, Alcohol, and Volatile Acids from Corncobs, W. H. Petersan, E. B. Fred and J. H. Verhulst. Jl. Industrial & Eng. Chem., vol. 13, no. 9, Sept. 1921, pp. 757-759. Concludes that corncobs may be utilized to produce acetone, ethyl alcohol, formic acid, and acetic acid, by fermenting a syrup made from corncobs by hydrolysis with dilute sulphuric acid.

Fuel. Alcohol as a Combustion Fuel, E. C. Freeland and W. G. Harry. Sugar, vol. 23, no. 9, Sept. 1921, pp. 474-476. Concludes that alcohol is destined to supplant gasoline. (Continuation of serial.)

Molasses as Source. Use of Alcohol Made From Final Molasses As Motor Power in Cuba, R. G. Tillery. La. Planter & Sugar Manufacturer, vol. 67, no. 9, August 27, 1921, pp. 142-143.

ALIGNMENT CHARTS

Principles and Uses. The Alignment Chart, C. W. Crockett. Automotive Industries, vol. 45, no. 13, Sept. 29, 1921, pp. 614-618, 5 figs. Exposition of principles underlying construction of alignment charts. Used for graphical representation of many mathematical relations.

ALLOY STEEL

Heat Treatment. Three Types of Alloy Sheet Steel—II and III, Horace C. Knerr. Iron Age, vol. 108, nos. 11 and 12, Sept. 15 and 22, 1921, pp. 655-658 and 725-728, 7 figs. Sept. 15: Details of heat treatment necessary to attain highest tensile strength; hardness and other data. Sept. 22: Electric and acetylene welding details and their effect on physical properties; chrome-vanadium steel adopted.

ALLOYS

Metamorphosis. Metamorphosis in Metal Alloys (Ueber Umwandlungen an Metallegierungen), F. Hauser. Zeit. für Physik, vol. 5, no. 4, June 23, 1921, pp. 220-226, 7 figs. Writer has succeeded in following process of transformation, occurring in certain metals and alloys after congealing, under a metal microscope and of making photographic reproductions thereof.

Physical Properties. Thermal, Electrical and Magnetic Properties of Alloys, Alpheus W. Smith. Jl. Franklin Inst., vol. 192, nos. 1 and 2, July and Aug. 1921, pp. 69-105 and 157-202, 57 figs. Deals with metals insoluble in each other, completely soluble in each other, with limited solubility in each other, and forming compounds with each other. Notes on change of thermoelectromotive force with temperature; theories of resistance and thermoelectric forces, and resistance and hardness.

White-Metal Bearings. White Metal Bearing Alloys, John R. Freeman, Jr. and R. W. Woodward. Metal Ind., vol. 19, no. 9, August 26, 1921, pp. 149-

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

152, 3 figs. Discusses design of new apparatus and results of tests to determine mechanical properties in compression and Brinell hardness at elevated temperatures. Technologic paper Bur. Standards, No. 188.

[See also ALUMINUM ALLOYS; BEARING METALS; BRASS; BRONZES, COPPER ALLOYS; MAGNESIUM ALLOYS; NICKEL ALLOYS; ZINC ALLOYS.]

ALUMINUM

Castings. Aluminum Casting. F. A. Livermore. Brass Wld., vol. 17, no. 8, August 1921, pp. 231–233. Discusses hardness and composition of alloys, also welding aluminum.

Uses. Aluminum and Its Uses (L'aluminium et ses applications). Sigma. La Metallurgie, vol. 53, nos. 35 and 36, Sept. 1 and 8, 1921, pp. 1663–1664 and 1701–1702. Discusses its properties and application in aeronautics. (Concluded.)

ALUMINUM ALLOYS

Aluminum-Copper. Aluminum-Copper Alloys. Robert J. Anderson. Am. Electrochemical Soc. advance paper no. 16, for Meeting, Sept. 29–Oct. 1, 1921, pp. 207–236, 1 fig. General information with regard to manufacture, properties, and uses of commercial aluminum-copper alloys employed in United States. Bibliography.

Aluminum-Magnesium-Silicon. The Constitution and Age-Hardening of the Alloys of Aluminium with Magnesium and Silicon. D. Hanson and Marie L. V. Gayler. Inst. Metals advance paper for meeting Sept. 21–22, 1921, no. 10, 35 pp., 47 figs. Results of investigation, summarized in diagrams, are said to leave little doubt that ageing of these alloys is due to fact that, on quenching, magnesium and silicon are retained, probably in solution, in an unstable condition, from which they tend to revert to a more stable form.

Iron-Pot Melting. Iron-Pot Melting Practice for Aluminum Alloys—IV. Robert J. Anderson. Metal Ind. (N. Y.), vol. 19, no. 9, Sept. 1921, pp. 360–362, 2 figs. Discusses size and capacity of furnaces, furnace linings and their life. (To be continued.)

Production. Experiments in the Production of Alloys for Aluminium Sheets. W. Schulte. Metal Ind. (Lond.), vol. 19, no. 8, August 19, 1921, pp. 131–134. Gives physical properties of a large number of alloys of different composition. Translated from Die Metallbörse.

AUTOGENOUS WELDING

Copper. Autogenous Copper Welding (Autogene Kupferschweissungen). Adolf Bothe. Betrieb, vol. 3, no. 22, Aug. 13, 1921, pp. 689–693, 6 figs. Describes how new or damaged copper engine or boiler parts, even when highly stressed, can be joined together or repaired through autogenous welding, quickly and durably, and with minimum cost.

Autogenous Welding of Copper Locomotive Fireboxes (Autogenschweissung von kupfernen Lokomotivfeuerbüchsen). H. Weese. Zeit. des Vereines deutscher Ingenieure, vol. 65, no. 36, Sept. 3, 1921, pp. 945–947, 11 figs. Account of work done in main railway shop in Magdeburg-Buckbau, Germany. Advantages of welding work which can be carried out in short time and without detachment of boiler. Experiences with oxy-acetylene welding. Success of different welding operations.

AUTOMOBILE ENGINES

Crankshafts. The Rolls-Royce Crankshaft. Fred H. Colvin. Am. Mach., vol. 55, no. 12, Sept. 22, 1921, pp. 453–454, 4 figs. Main bearings rough turned, crankpins ground from the rough. Finishing completed unit of crankshaft, flywheel and clutch ring.

Jordan. Important Changes Feature the New Jordan Model. J. Edward Schipper. Automotive Industries, vol. 45, no. 14, Oct. 6, 1921, pp. 654–657, 7 figs. New design of Jordan engine, incorporating chain drive and hollow shaft lubrication. Exposed metal parts are rustproofed.

Machining. Machining Motor-car Engine Flywheels. Machinery (Lond.), vol. 18, no. 465, August 25, 1921, pp. 641–645, 13 figs. Use of vertical automatic lathes for finishing all surfaces at two settings of work.

Pistons. Manufacturing Automobile Pistons in a Jobbing Shop. Robert Mawson. Am. Mach., vol. 55, no. 13, Sept. 29, 1921, pp. 493–496, 11 figs. Manufacturing on small scale made possible in job shop by use of simple tools and fixtures.

AUTOMOBILE FUELS

Alcohol. Production of 95–97 per cent Alcohol for Motor Fuel. Int. Sugar Jl., vol. 23, no. 273, Sept. 1921, pp. 513–516, 1 fig. Describes improved triple column continuous still made by Blair, Campbell & McLean of Glasgow for production of Natilite.

See also ALCOHOL.

Producer Gas. Producer Gas as a Fuel for Automotive Vehicles. P. M. Heldt. Automotive Industries, vol. 45, nos. 10 and 11, Sept. 8 and 15, 1921, pp. 461–464 and 507–511, 7 figs. Discusses theoretical and practical aspect of possibility of operating truck or similar internal-combustion engines on gas derived directly from coal. Describes three British systems and their method of operation.

[See also GASOLINE.]

AUTOMOBILES

Air-Propeller-Driven. Air Screw Drive for Cars. W. F. Bradley. Autocar, vol. 47, no. 1351, Sept. 10, 1921, pp. 448–449, 4 figs. Describes recent developments with wind cars in Paris.

Australian Use. A Car Especially Designed for Use in Australia. Automotive Ind., vol. 45, no. 9, Sept. 1, 1921, pp. 409–410, 3 figs. Designed to meet tropical climate and adverse road conditions.

Horstman. The 10.5 Hp. Horstman Chasis. Automobile Engr., vol. 11, no. 153, August 1921, pp. 273–277, 13 figs. Original detail design and full cantilever springing fore and aft.

Hudson. Refinements in Control Characterize the New Hudson. J. Edward Schipper. Automotive Industries, vol. 45, no. 13, Sept. 29, 1921, pp. 604–606, 8 figs. Clutch and brake controls and steering gear have been redesigned to facilitate ease in handling; carbureter air is preheated.

G. Irat. The G. Irat Car (La voiture G. Irat). A. Contet. La Vie Automobile, vol. 17, no. 763, August 25, 1921, pp. 293–295, 6 figs. Designed for greatest economy without sacrificing speed. Four cylinder engine 70 × 130.

Interaction of Wheels, Springs and Roads. Holding The Road. J. L. Napier. Automobile Engr., vol. 11, no. 153, August 1921, pp. 266–272, 12 figs. Discussion of fundamental principles affecting interaction of wheels, springs and roads.

Machining Methods. Special Fixtures in the Peerless Shop. Am. Mach., vol. 55, no. 14, Oct. 6, 1921, pp. 549–550, 7 figs. Milling fixtures for continuous work; fixture for grinding ball ends; radius milling and threading; drilling connecting rods.

Plywood Bodies. Plywood as Material for Automobile Body Construction. Armin Elmendorf. Automotive Ind., vol. 45, no. 9, Sept. 1, 1921, pp. 414–417, 8 figs. Discusses waterproof glue development and advantages of plywood.

Rear-Axle Casing. Machining Rear Axle Casings. Machinery (Lond.), vol. 18, no. 470, Sept. 29, 1921, pp. 781–786, 11 figs. Discusses methods of machining a malleable iron casting for motor rear-axle casing. Production costs.

Rear-Axle Housing. Machining Two Peerless Rear-Axle Parts. Fred H. Colvin. Am. Mach., vol. 55, no. 13, Sept. 29, 1921, pp. 510–512, 9 figs. Notes on machining and assembly of rear-axle housing; fixtures used in production brake spider.

Repairing Methods and Equipment. Automotive Service Methods and Equipment. Howard Campbell. Am. Mach., vol. 55, no. 16, Oct. 20, 1921, pp. 619–623, 11 figs. Tools and methods used at New York Packard service plant, including testing fixtures, special reamers and other tools. "Maximum estimate" system.

Rhode Light Car. The Rhode Light Car. Auto, vol. 26, no. 37, Sept. 15, 1921, pp. 797–800, 11 figs. A 10-hp. car built by Mebes & Mebes, London, W. Describes engine (four-cylinder monoblock type with overhead valves inverted in detachable head), transmission, suspension, and equipment.

Rover Runabout. Engineering Features of a Popular British Runabout. M. W. Bourdon. Automotive Ind., vol. 45, no. 9, Sept. 1, 1921, pp. 404–406, 3 figs. Describes 8-hp. air-cooled Rover.

Shop Practice, Daimler. The Works of the Daimler Co., Ltd. Automobile Engr., vol. 11, no. 153, August 1921, pp. 285–290, 20 figs. Interesting examples of shop practice on special work, at Coventry, Eng.

Suspension. Acme Spring Suspension. Autocar, vol. 47, no. 1350, Sept. 3, 1921, pp. 427–428, 4 figs. Describes three cantilever spring system for insulation from rough shocks.

Suspensions for Automobiles (Le problème de la suspension des voitures automobiles). M. Broulhiet. Révue de l'Industrie Minérale, no. 17, Sept. 1, 1921, pp. 93–100, 7 figs. It is shown that perfection can be attained in this as well as in other parts of automobile. (Concluded.)

Wheels. The Production of Pressed Steel Wheels Is Successfully Accomplished. J. Edward Schipper. Automotive Industries, vol. 45, no. 14, Oct. 6, 1921, pp. 668–671, 9 figs. Describes the various operations required in fabricating Gier pressed steel disk wheel.

[See also CARBURETORS.]

AVIATION

Civil. Developing a Ground Organization for Civil Aviation—II. W. F. Bradley. Automotive Industries, vol. 45, no. 13, Sept. 29, 1921, pp. 622–626, 6 figs. Discusses commercial aviation in France based on system of government subsidies. Particulars of air traffic; diagrams of 1st, 2nd, 3rd and 4th class landing fields. (Concluded.)

European Air Routes. The European Air Traffic Network (Das europäische Luftverkehrsnetz). George P. Neumann. Verkehrstechnik, vol. 38, May-June, 1921, pp. 218–221, 1 fig. Includes map showing air routes already in operation and those for which preparations have been made.

Future Prospects. The Future of Aerial Transport in the Public Services (L'Avvenire dei Trasporti Aerei Nei Servizi Pubblici). Umberto Nobile. Giornale del Genio Civile, vol. 59, May 31, 1921, pp. 270–304, 1-fig. Discusses security of aeroplanes, aerotransports and dirigibles; regularity of service; cost of aerial transportation compared with other systems; replacing of aerial material; etc.

B

BALANCING

Unbalance, Static and Dynamic. Four Years of Balancing Practice. N. W. Akimoff. Shipbldg. & Shipg. Rec., vol. 18, no. 10, Sept. 8, 1921, pp. 311–314, 6 figs. Discusses static unbalance, dynamic unbalance, obstacles in the development of the art, etc. (From Jl. Am. Soc. Naval Engrs.)

BEARING METALS

Bronze. Bronze for Bearing Metal. E. T. Keenan. Power, vol. 54, no. 9, Aug. 30, 1921, pp. 322–323. States that satisfactory results for general use was obtained with alloy consisting of copper 75 per cent, lead 17 per cent, zinc 5 per cent, tin 3 per cent.

BEARINGS, BALL

Manufacture. Ball and Roller Bearing Manufacture—I, J. D. Scaife. Eng. Production, vol. 3, nos. 52, 53 and 54, Sept. 29, Oct. 6 and 13, 1921, pp. 290–293, 314–319 and 340–343, 25 figs. Methods employed. Paper presented before Instn. Production Engrs. Oct. 13. Discussion.

The Ball Bearing: In The Making, Under Test, and on Service. Henry L. Heathcote. Mech. Wld., vol. 70, nos. 1808 and 1811, Aug. 26 and Sept. 16, 1921, pp. 159–161, 3 figs. and 220–222, 3 figs. (Continuation of serial.) Paper read before Instn. Automobile Engrs.

BEARINGS, ENGINE

Machine for Fitting. Lapping and Running-in Machine. Machinery (Lond.), vol. 18, no. 470, Sept. 29, 1921, pp. 791–793, 4 figs. Discusses running-in and lapping processes in connection with fitting automobile engine bearings.

BELTING

Quarter-Twist. On an Irregular Behavior of Ordinary Quarter Twist Belt and Its Prevention. Hosaku Iwaoka. Jl. Soc. Mech. Engrs. & Soc. Nav. Architects, Sept. 1921. (In Japanese.)

BLAST FURNACES

Crane Iron Works, Pa. New Blast Furnace of the Crane Iron Works, Richard Peters. Iron Age, vol. 108, no. 31, Sept. 29, 1921, pp. 814–817, 5 figs.; also Iron Trade Rev., vol. 69, no. 13, Sept. 29, 1921, pp. 803–806, 4 figs. Plant at Catasauqua, Pa., modernized. Coke is now used as fuel. New stack is designed to produce foundry, forge and basic iron from mixture of 65 per cent magnetite ore and 35 per cent non-bessemer Mesabi ore.

Crane Operation. Crane Operating Costs at Blast Furnaces. George L. Collord. Iron Age, vol. 108, no. 15, Oct. 13, 1921, pp. 935–936, 1 fig. Locomotive and ore-bridge cranes shown to save much money, compared with hand methods formerly used. Analyses of costs.

Design. Completes New 600-Ton Blast Furnace in Ten Months. Iron Trade Rev., vol. 69, no. 11, Sept. 15, 1921, pp. 688–693, 6 figs.; also Iron Age, vol. 108, no. 11, Sept. 15, 1921, pp. 673–679, 9 figs. Details of plant of Trumbull-Cliffs Furnace Co. for delivery of hot metal to mixer at open-hearth building of Trumbull Steel Co.

Special Features of Blast Furnace Plant. Iron Age, vol. 108, no. 12, Sept. 22, 1921, pp. 730–732, 2 figs. Auxiliary features of new blast-furnace plant of Trumbull-Cliffs Furnace Co., Warren, Ohio, including methods of firing boilers, regulating blast and of handling water.

St. Louis. Blast-Furnace Plant of the St. Louis Coke and Chemical Company. Iron & Coal Trades Rev., vol. 103, no. 2791, Aug. 26, 1921, pp. 257–258, 6 figs. Describes general equipment. Includes two batteries of 40 coke ovens each.

Zinc. A Blast Furnace for Zinc. Evans W. Buskett. Eng. & Min. Jl., vol. 112, no. 11, Sept. 10, 1921, pp. 409–410. Experiments in smelting of ores under pressure suggested which might result in economies over present methods.

BOILER FEEDWATER

Grease in. Grease in Boiler Feed Water. Edward Ingham. Colliery Guardian, vol. 122, no. 3163, August 12, 1921, pp. 447–448. Explains how grease gets into boiler, its deleterious effect, and how to remove grease.

Softening. Boiler Feed Water Purification—II. Eng. & Indus. Management, vol. 6, no. 9, Sept. 1, 1921, pp. 230–231. Outlines respective merits of various methods used for boiler feedwater treatment, with special reference to advantage of the Zeolite water-softening process.

Treatment. Boiler Feed Water Treatment and Treatment Control. E. G. Bashore. Combustion, vol. 5, no. 4, Oct., 1921, pp. 163–166. Discusses boiler compounds, feedwater heaters, continuous tank systems, intermittent tank system, zeolite and internal treatment. (Abstract.) Paper read before Chem. Exposition.

Boiler Water Treatment Plants. Robert June. Blast Furnace & Steel Plant, vol. 9, no. 9, Sept. 1921, pp. 564–566. Formulates specifications for ideal water-purification plants.

The Treatment of Boiler Feed Water. Robert June. Power House, vol. 14, no. 17, Sept. 5, 1921, pp. 21–23, 2 figs. Discusses treatment with boiler compounds, graphite, kerosene, zinc, boiler metal treatment, water softening and purifying systems.

Water Treatment for Boilers. Julian S. Simsohn. Mech. Eng., vol. 43, no. 9, Sept. 1921, pp. 597–600 and 606, 2 figs. Various methods of water softening. Treatment of excessive concentration of soluble salts in boiler. Corrosion of boilers and economizers due to decomposition of organic compounds at high temperatures accompanying present steam pressures and superheats, etc.

BOILER OPERATION

Control. The Control of Boiler Operation. Walter N. Flanagan. Assn. Iron & Steel Elec. Engrs., vol. 3, no. 9, Sept. 1921, pp. 453–469, 5 figs. Discusses hand and automatic control, a.c. and d.c. drive for auxiliaries.

Efficiency as Affected by Draft. Boiler Efficiency

and Output as Affected by Draught, Alexander R. Horne. Engineer, vol. 142, no. 3430, Sept. 23, 1921, pp. 322-323, 3 figs. Investigates relations between efficiency, evaporative power and stokehold air pressure in steam boiler, in light of results of series of twelve exhaustive tests carried out by five authorities upon a marine boiler of Inglis type.

Efficient. Successful Boiler Operation, Guy L. Warden. Combustion, vol. 5, no. 3, Sept. 1921, pp. 116-117. Discusses type of equipment, its arrangement for operation, operators and their instructions, accessories and instruments.

Industrial. The Practical Operation of Industrial Boilers, W. E. Snyder. Mech. World, vol. 70, no. 1811, Sept. 16, 1921, pp. 231-232. Discusses instruments in boiler room and their proper use, training of operators, etc. (Continued.)

BOILER PLANTS

Equipment. Modern Boiler House Arrangement and Equipment, R. M. Gordon. Combustion, vol. 5, no. 4, Oct. 1921, pp. 159-161, 8 figs. Describes boiler plant of Solvay Process Co., an outgrowth of several smaller plants. (Abstract.) Paper read before Chem. Exposition.

BOILERS

Electrically Heated. Electrically Heated Steam Boilers, Eric A. Lof. Power Plant Eng., vol. 25, no. 18, Sept. 15, 1921, pp. 919-920, 3 figs. Electric boiler problem in general does not offer any technical difficulties; used where power is very cheap.

Hand-Fired. Hand-Fired-Boiler Performance in France, Carroll F. Merriam. Power, vol. 54, no. 13, Sept. 27, 1921, pp. 473-474. Contains abstract of report of First Subcommittee of Commission for Utilization of Fuels, published in Revue Générale de l'Électricité; and comparison of American and French boiler performances.

Steam-Heating. Largest Boiler to Supply Steam for Heating, J. H. Walker. Power, vol. 54, no. 13, Sept. 27, 1921, pp. 477-478, 2 figs. Details of saturated steam boiler unit having 29,820 sq. ft. of steam-making surface, being installed in heating plant of Detroit Edison Co. Volume of combustion chamber, 11,440 cu. ft. Two 14-retort motor-driven underfeed stokers have fuel-burning capacity of 33,600 to 39,200 lb. of coal per hr.

BOILERS, WATER-TUBE

New Designs. The Three New Designs of Water Tube Boilers, Tsuruzo Matsumura. Jl. Soc. Mech. Engrs. & Soc. Nav. Architects, Sept. 1921. (In Japanese.)

BRAKES

Engine-Testing. Air-brakes for Engine Testing, Etc., A. T. Cross. Mech. Wld., vol. 70, no. 1808, August 26, 1921, pp. 168-169, 5 figs. Describes a cheap and simple method of constructing an absorption brake for determining the b.hp. of any size engine.

BRASS

Pickling of Strip. Continuous Pickling of Strip Brass, Wadsworth Doster. Metal Ind. (Lond.), vol. 19, no. 8, August 19, 1921, pp. 137-138, 4 figs. Describes the automatic strip cleaning machine used in brass rolling mills.

Red, Lead in. The Influence of Lead in Red Brass (Der Einfluss des Bleies im Rotguss), J. Czochralski. Zeit. fur Metallkunde, vol. 13, no. 7, Apr. 1921, pp. 171-178, 13 figs. Investigation of its influence on tensile strength, dilatation, hardness, torsional strength, and shock resistance.

Tempering with Tin Content. Tempering Brasses With a Tin Content (La Trempe des laitons à l'étain), Leon Guillet. Revue de Métallurgie, vol. 18, no. 7, July 1921, pp. 445-458, 26 figs. Concludes that one per cent of tin does not have the bad effect on mechanical properties generally attributed to it.

BRASS FOUNDING

Casting of Ingots. The Casting of Brass Ingots, R. Genders. Inst. Metals advance paper for meeting Sept. 21-22, 1921, no. 3, 4 pp., 2 figs.; also Engineering, vol. 112, no. 2908, Sept. 23, 1921, p. 452, 2 figs. Results of experiments carried out to minimize occurrence of non-metallic inclusions. Describes method involving use of short broad tapered ingots with dozzle feed, by use of which, it is claimed, failures and wastage were considerably reduced.

England. Modern Developments in the British Brass Industry, Ernest A. Smith. Am. Electrochemical Soc. advance paper, no. 24, for Meeting, Sept. 29-Oct. 1, 1921, pp. 301-326. Discusses electric brass furnaces in England; extrusion, hot pressing and forging of brass; rolling-mill practice; annealing; composition of industrial brasses; and treatment and utilization of scrap brass.

BRONZES

Low-Tin. The Effect of Progressive Cold-Drawing upon Some of the Physical Properties of Low-Tin Bronze, W. E. Alkins and W. Cartwright. Inst. Metals advance paper for meeting Sept. 21-22, 1921, no. 6, 23 pp., 17 figs. Experimental data is summarized in diagrams showing variation during cold-drawing of the three properties, tensile strength, specific volume, and scleroscope hardness.

Manganese. Casting Manganese Bronze Test Bars, E. H. Dix, Jr. Foundry, vol. 49, no. 18, Sept. 15, 1921, pp. 734-736, 1 fig. Discusses several methods of casting and compares results of physical tests.

C

CAR WHEELS

Molding. Molds Car Wheels on Jolt Machines. Foundry, vol. 49, no. 18, Sept. 15, 1921, pp. 709-713, 11 figs. Made possible by adaptation of conveyor systems for transferring molds, flasks and sand.

Novel Mechanical Molding of Car Wheels. Iron Age, vol. 108, no. 11, Sept. 15, 1921, pp. 662-664, 6 figs. Foundry of Brown Car Wheel Works, Inc., Buffalo, N. Y., has moving platform to handle molds from molding machines, through pouring stage and to shake-out machines.

Tires. British Standard Specification for Tramway Tyres. British Eng. Standards Assn., no. 101, July 1921, 11 pp., 7 figs. Includes conversion table from tons to pounds; appendix giving forms of British standard tensile test pieces; and diagram illustrating British standard tires for tramway driving and pony wheels.

CARBURETORS

Zenith Triple-Diffuser. A New Carburetor (Un Nouveau Carburateur), R. Villers. La Nature, no. 2471, August 13, 1921, pp. 100-104, 7 figs. Describes Zenith triple-diffuser carburetor.

CARS

Frames. A Study of Carriage Frames (Etude des Chassis de Wagons), M. Le Touzé. Revue Générale des Chemins de Fer, vol. 40, no. 9, Sept. 1921, pp. 185-205, 11 figs. Calculates stresses in car or carriage frames when over 10-12 in. long and describes successful method of construction by Compagnie de l'Est.

CARS, PASSENGER

Insulation of. Insulation of Passenger and Refrigerator Cars, Arthur J. Wood. Ry. Mech. Engr., vol. 95, no. 9, Sept. 1921, pp. 547-549. Discussion of principles involved in determining heat transmission under various conditions.

CARS, REFRIGERATOR

Temperature Control. Controlling Refrigerator Car Temperature in Winter Months. Ry. Rev., vol. 69, no. 10, Sept. 3, 1921, pp. 293-297, 9 figs. Department of Agriculture makes practical suggestions for reducing loss and damage to fruit shipped in refrigerator cars during winter months.

CASTINGS

Breaking and Deformation. Breaking and Deformation of Castings Whose Thickness Varies Very Much (Rotture e Deformazione Nei Getti di Ghisa a Spessori Assai Diversi), Piero Gatti. L'Industria, vol. 35, no. 14, July 31, 1921, pp. 319-321, 2 figs. Discusses design, patterns, quality of metal, drill molds.

Specification and Testing. The Specification and Testing of Castings, Walter Rosenhain. Automotive Industries, vol. 45, no. 5, August 4, 1921, pp. 217-219. Analyzes various methods and indicates best practice under present conditions.

CENTRAL STATIONS

Power in Middle West. Location and Distribution of the Central-Station Power of the Middle West, W. L. Abbott. Mech. Eng., vol. 43, no. 7, July 1921, pp. 443-444 and 458, 2 figs. Notes on location of water powers; question of power plants at mine mouth; location of power stations and distribution lines.

CHAIN DRIVE

Roller Chain. The Development of the Roller Chain Drive, G. M. Bartlett. Automotive Industries, vol. 45, no. 8, August 25, 1921, pp. 363-366, 6 figs. Discusses changes in design and construction of chains and sprockets and a new form of roller-chain sprocket tooth. From paper presented at meeting of Gear Manufacturers' Assn.

CHROME-NICKEL STEEL

Heat Treatment and Characteristics. Nickel-chromium Steels: Their Heat-Treatment and Characteristics, W. E. Murphy. Machinery (Lond.), vol. 18, no. 465, August 25, 1921, pp. 638-639, 2 figs. Gives mechanical properties; shows effect after oil-hardening and air-hardening.

CHUCKS

Magnetic. Magnetic Chucks Require Careful Mounting, F. Horner. Can. Machy., vol. 26, no. 9, Sept. 1, 1921, pp. 33-35, 7 figs. Mounting can be of permanent or temporary character; magnetic holding faces of chuck must be absolutely correct.

COAL HANDLING

Locomotive Cranes. Economical Coal Handling With Locomotive Cranes, H. D. Fisher. Combustion, vol. 5, no. 3, Sept. 1921, pp. 108-110, 4 figs.

Power Installation. Power Installation at Coverdale Mine, Charles M. Means. Trans. Am. Inst. Min. & Metallurgical Engrs., no. 1101-C, Sept. 1921, 14 pp., 3 figs. Details of coal-handling system installed at Pittsburgh Terminal R. R. & Coal Co.'s new shaft. Main hoist is first Ilgner-Ward-Leonard hoisting installation in Pittsburgh district. Operating conditions: Total lift, 405 ft.; inclination of shaft to horizontal, 90 deg.; weight of cage, 20,000 lb.; weight of load (coal) 10,000 lb., (slate) 16,000 lb.; weight of cars, 5000 lb.

COLD STORAGE

English Docks. The Development of Cold Storage at the Avonmouth Docks, Thomas A. Peace. Cold Storage & Ice Assn. Proc., vol. 17, no. 2, 1921, pp. 17-32 and (discussion) 33-40, 3 figs. on supp. plates. Describes cold storage in various transit sheds, refrigerating machinery in Avonmouth and Royal Edward docks, and electrical arrangements.

Mechanical Handling of Meats and Produce. The Mechanical Handling of Meat and Produce in Cold Storage, S. G. Calladine. Cold Storage & Ice Assn. Proc., vol. 17, no. 2, 1921, pp. 43-50 and (discussion) 51-58, 6 figs. on supp. plates. Discusses existing methods and various types of conveyors used, comparative cost, etc.

Piping for Rooms. Piping Required in Cold Storage Rooms, Benj. J. Masters. Southern Engr., vol. 36, no. 1, Sept. 1921, pp. 38-41. Calculates piping for various conditions.

COMBUSTION

New Theories. New Combustion Theories (Nyare Förbränningsteorier), Hilding Håkanson. Teknisk Tidskrift (Veckoupplagan), vol. 51, no. 37, Sept. 17, 1921, pp. 381-387, 6 figs. Discusses theories of Nusselt, Neumann, Aufhauser.

CONDENSERS, STEAM

Air Pumps for. Recent Improvements in Condensing Apparatus for Steam Engines (Recents perfectionnements des appareils de condensation des machines a vapeur d'eau), L. Jauch. Chaleur et Industrie, vol. 2, no. 16, August 1921, pp. 501-508, 13 figs. Discusses air pumps of various types. (Continuation of serial.)

Scale Prevention. Installations for the Prevention of Scale Formation in Surface Condensers (Anlagen zur Verhütung von Wassersteinbildung in Oberflächen-Kondensationen), Hans Rissmann. Zeit. des Oberschlesischen Berg- u. Hüttenmännischen Vereins, vol. 59, no. 6, 1920, pp. 185-205, 33 figs. The Balcke inoculation process as modern protection against incrustation and silting up with mud, and its economic advantages. Process so-called because it renders cooling water immune from influence of scale-producing salts.

Surface. Surface Condenser Operation, George C. Cook. Power, vol. 54, no. 10, Sept. 6, 1921, pp. 365-367. Notes on vacuum decrease with temperature increase; quantity of circulating water required; air and steam distribution; removing deposits from inside surfaces; and other methods of cleaning.

Surface and Jet. Modern Surface and Jet Condensers, K. Hoefer. Eng. Progress, vol. 1, no. 7-8, July-August 1920, pp. 237-242, 14 figs. Describes various types, results of tests, cleaning during running.

Tests of Various Types. Relative Efficiency of Various Types of Condensing Apparatus, Allen F. Brewer and Frank A. Stivers. Mech. Eng., vol. 43, no. 10, Oct. 1921, pp. 672-673. Results of comparative tests carried out on double-pipe coils, submerged coils with and without manifolds, and cooling towers, and of value as guide in selection and design of most efficient type of condenser.

Water-Distributing Device. New Water Distributing Device For Condensers, George M. Kleucker. Ice & Refrigeration, vol. 61, no. 2, August 1921, p. 84, 1 fig. Discusses U. S. Patent 1,291,926.

CONNECTING RODS

Machining. Machining Connecting Rods. Machinery (Lond.), vol. 18, no. 369, Sept. 22, 1921, pp. 759-763, 13 figs. Manufacturing methods employed by Austin Motor Co., Longbridge Works, Birmingham, for producing balanced connecting rods.

COPPER ALLOYS

Copper-Zinc. The Density of the Copper-Zinc Alloys, T. C. Bamford. Inst. Metals advance paper for meeting Sept. 21-22, 1921, no. 4, 12 pp., 4 figs. Results of investigation of both chill and sand-cast billets show that with only one exception the densities of sand-cast specimens are less than those of chill-cast ones.

COST ACCOUNTING

Mechanical. Cost Accounting by Machinery, E. W. Workman. Eng. & Indus. Management, vol. 6, no. 12, Sept. 22, 1921, pp. 314-318, 4 figs. Describes Hollerith systems of mechanical sorting and tabulating, application of these systems to problems of collecting labor and overhead expenses, and applying them to costs of manufactured articles, etc.

Methods. The Necessity of Proper Cost Accounting, J. B. Sehl. Forging & Heat Treating, vol. 7, no. 8, August 1921, pp. 432-434. Methods of distributing expense over product are, the percentage, man hour, sold hour, list percentage and machine rate or production center methods.

Overhead, Allocation of. The Correct Allocation of On-Costs, H. Varley. Eng. & Indus. Management, vol. 6, no. 9, Sept. 1, 1921, pp. 241-242. Where reductions can be made.

Uniform System. Uniform Cost System Use Advised, Robert E. Belt. Iron Trade Rev., vol. 69, no. 13, Sept. 29, 1921, pp. 807-809. Points out benefits to be derived by introduction of such a system; too much detail has proved detrimental. States that accountant should be familiar with manufacturing methods.

CRANES

Harbor. Modern Harbour Cranes, Richard Hänchen. Eng. Progress, vol. 1, no. 6, June 1920, pp. 203-210, 10 figs. Describes slewing, travelling, gantry, and double cranes.

Level Luffing. A Level Luffing Crane. Engineer, vol. 132, no. 3431, Sept. 30, 1921, p. 354, 2 figs. Outstanding feature of crane supplied to Great Western Ry. Co. by Wellman Smith Owen Eng. Corp., Ltd., London, is arrangement provided for moving load along a horizontal path while jib of crane is being luffed, thus saving both time and power in manipulating it.

Operator's Manual. Crane Operator's Manual, L. F. Galbraith. Assn. Iron & Steel Elec. Engrs., vol. 3, no. 9, Sept. 1921, pp. 437-452, 12 figs. Duties

of crane operators, including inspection, reports, operations, etc. (Report of Educational Committee for 1921.)

Shipyard. Mammoth Cranes For Shipyard and Harbour Service, Richard Hänchen. Eng. Progress, vol. 1, no. 11, November 1920, pp. 335–339, 11 figs. Describes stationary cranes, their construction and development, including cantilever jib cranes of 250 tons carrying capacity.

Steam Goliath. 20-Ton Steam Goliath Crane. Engineer, vol. 132, no. 3432, Oct. 7, 1921, p. 381, 2 figs. on p. 374. Built for 60-ft. span with clear lift of 32 ft. Engines are of double-cylinder and boiler of vertical type.

CUTTING TOOLS

Selection and Use. Selection and Proper Use of Cutting Tools. Can. Machy., vol. 26, no. 9, Sept. 1, 1921, pp. 36–40, 15 figs. Discusses design, use in operation, maintenance, etc.

CYLINDERS

Steel, Tests of. Experiments on the Effects of Extremely High Pressures, P. W. Bridgman. Compressed Air Mag., vol. 26, no. 9, Sept. 1921, pp. 10223–10225, 4 figs. Describes experimental tests of tool steel and mild steel cylinders, the former rupturing at 40,000 atmospheres.

D

DIE CASTING

Advantages. Die Casting—I and II, A. G. Hopking. Engineer, vol. 132, nos. 3429 and 3430, Sept. 16 and 23, 1921, pp. 281–282 and 309–311, 5 figs. Description and advantages of die-casting process, and some of its uses.

DIES

Die-Sinking Machines. Die Sinking and Metal Patternmaking by Automatic Machine, Joseph F. Keller. Mech. Eng., vol. 43, no. 9, Sept. 1921, pp. 584–588 and 606, 16 figs. Discusses dies used for stamping, forging, embossing, pressing, etc. Notes on various methods employed in die sinking; automatic die-sinking machines; duplicating machines; advantages and relative cost of machine-cut dies.

Die-Sinking Machine. Engineering, vol. 112, no. 2905, Sept. 2, 1921, pp. 341–342, 4 figs. Constructed by Bryant Symons & Co., London, for cutting dies used in drop-forging work.

Electrical Terminals and Connectors. Dies for Electrical Terminals and Connectors. Machinery (Lond.), vol. 18, no. 468, Sept. 15, 1921, pp. 733–736, 10 figs. Discusses piercing, trimming and forming dies, and dies for making band clamp ends.

Self-Opening Die Heads. Self-Opening Die Heads. Eng. Production, vol. 3, nos. 51 and 52, Sept. 22 and 29, 1921, pp. 269–274 and 296–300, 35 figs. Design, construction and application.

DIESEL ENGINES

Construction and Lubrication. Diesel Engine Practice—I, A. H. Pritchard. Power Plant Eng., vol. 25, no. 18, Sept. 15, 1921, pp. 901–903, 4 figs. Discusses Diesel oil engine, construction and lubrication.

Ignition. Internal-Combustion Engines, Charles E. Lucke. Power, vol. 54, no. 13, Sept. 27, 1921, pp. 479–483, 18 figs. Ignition problems in semi-Diesel and Diesel oil engines.

Improvements. Innovations in Diesel Engine Construction. Mar. Eng., vol. 26, no. 9, Sept. 1921, pp. 700–701, 1 fig. German builders introducing novelties in Burmeister and Wain design; Blohm and Voss building new double acting engine.

Knocks. Knocks in Diesel Engines, Louis R. Ford. Power, vol. 54, no. 9, Aug. 30, 1921, pp. 327–328. Deals with worn bearing knocks, knocks in valve gear, and within cylinder. Characteristics and causes.

Marine. Diesel and Semi-Diesel Marine Engines—Renault System (Les moteurs Diesel et Semi-Diesel Marine—système Renault), Ch. Dantin. Le Génie Civil, vol. 79, no. 11, Sept. 10, 1921, pp. 221–225, 10 figs. Discusses large increase in heavy-oil engines; describes Renault 300-hp. Diesel and 80-hp. semi-Diesel.

Marine Diesel Engine Operation (La conduite des moteurs Diesel marins), Y. Le Gallou. Bulletin Technique du Bureau Veritas, vol. 3, no. 7, July 1921, pp. 160–163. Studies causes of bad functioning, including air compressors and their influence, lubricating, etc. (Concluded.)

Overhauling. Overhauling an Oil Engine, G. Grow. Power, vol. 54, no. 10, Sept. 6, 1921, pp. 375–377, 7 figs. Author's experience in overhauling a Diesel engine.

DROP FORGING

Design of Parts. The Art of Drop Forging with Examples of Work. Can. Machy., vol. 26, no. 12, Sept. 22, 1921, pp. 25–28, 4 figs. Discusses design of parts, additional strength due to drop forging, etc.

Dies. Design and Making of Drop-forging Dies. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 123–124. Methods of heating, quenching and drawing carbon and alloy-steel dies.

Design and Making of Drop-forging Dies. Machinery (Lond.), vol. 18, no. 469, Sept. 22, 1921, pp. 749–752, 7 figs. Methods employed in modern drop-forging plants; die-sinking machines, two-impression dies, trimming, etc.

Drop Forgings—I. Machinery (Lond.), vol. 18, no. 468, Sept. 15, 1921, pp. 738–739, 3 figs. Discusses quantity required, quality of steel in drop forgings, simplicity or otherwise of dies required, and die cutting or sinking.

DRYING

Methods and Machines. Drying (Das Trocknen), H. Hausbrand. Zeit. des Vereines deutscher Ingenieure, vol. 65, nos. 33, 37 and 38, Aug. 13, Sept. 10 and 17, 1921, pp. 863–868, 966–970 and 994–998, 85 figs. Discusses various different properties of materials affecting their behavior during process of drying. Deals with drying through direct contact with heating surfaces, and with air drying. Schematic presentation of number of devices and machines used in drying.

E

EDUCATION

General, Needs of. General Education and the Engineering Profession, H. E. Miles. Mech. Eng., vol. 43, no. 8, Aug. 1921, pp. 517–520 and 550, 7 figs. Points out lack of vocational schools in United States and need for longer school year. Notes on continuation schools and training of teachers.

EDUCATION, INDUSTRIAL

Training of Metal Workers. The National Metal Trades Association and Industrial Education, Harold C. Smith. Mech. Eng., vol. 43, no. 8, Aug. 1921, pp. 521–522 and 550. Outline of its activities in training of new workers, with opinions of its committee on industrial education regarding apprenticeship, trade and continuation schools, instruction of foremen, training in plant, and vestibule schools.

ELECTRIC DRIVE

Mechanical Difficulties. Reducing Mechanical Difficulties With Motor-Driven Applications, Raoul Pruger and Louis A. Deesz. Elec. Jl., vol. 18, no. 9, Sept. 1921, pp. 408–413, 9 figs. Considers belted, geared, chain-driven and direct-connected drives, cushioned and uncushioned loads, etc.

ELECTRIC FURNACES

Annealing. Design Electric Annealing Furnace, C. E. Chaney. Foundry, vol. 49, no. 18, Sept. 15, 1921, pp. 720–723, 6 figs. Malleable iron is annealed in 42 hours.

Fuel-Fired vs. Comparison of Electric Furnace Practice with Fuel-Fired Furnace Practice, N. K. B. Patch. Am. Electrochemical Soc. advance paper, no. 22, for Meeting, Sept. 29–Oct. 1, 1921, pp. 287–290. Author's experiences are that cost of metal melted, melting losses, and solution of gases in metal, are substantially the same in electric and fuel-fired furnace, provided intelligent operation is pursued.

Girod. Electric Furnaces for Making Steel—VI, Alfred Stansfield. Blast Furnace & Steel Plant, vol. 9, no. 9, Sept. 1921, pp. 550–552, 1 fig. Describes Girod electrode-hearth arc-furnace at Bethlehem Steel Co.

Gray-Iron. Electric Furnace Gray Iron, Jas. L. Cawthon, Jr. Elec. Jl., vol. 18, no. 9, Sept. 1921, pp. 396–400, 4 figs. Discusses economies compared with cupola, addition of silicon, temperature control, etc.

Heat-Treating. Electric Furnaces and Heat Treatment, Edwin F. Gone. Iron Age, vol. 108, no. 11, Sept. 15, 1921, pp. 643–648, 10 figs. Survey of their commercial application to steel and other industries.

Levoz. The Electric Furnace (Le four électrique). Révue d'Electrochimie & d'Electrometallurgie, vol. 15, no. 3–4, March–April, 1921, pp. 57–61. Describes Levoz furnace which is capable of producing a good quality of metal with a minimum expenditure of electric power.

Muffled-Arc-Type. Recent Developments in Electric Furnaces of the Muffled Arc Type, H. A. Winne. Am. Electrochemical Soc., advance paper, no. 19, for Meeting, Sept. 29–Oct. 1, 1921, pp. 263–272, 5 figs. Smaller units of 1500 lb. and 100 lb. per hr. capacity are described in comparison to larger rectangular shell-type furnace. Discusses advantages of muffled-arc furnaces.

Non-Ferrous Metals. The Influence of the Electric Furnace on the Metallurgy of Non-Ferrous Metals, H. M. St. John. Am. Electrochemical Soc., advance copy, no. 3, pp. 55–75. Discusses gradual breaking down of secretiveness as to methods and results, melting of high-quality brass and bronze in ton lots, more convenient and economical handling of charges, etc. (Abstract.)

Progress in 1921. Electric Furnace Progress in 1921, E. T. Moore. Iron Age, vol. 108, no. 12, Sept. 22, 1921, pp. 723–724. Discusses merits of dual voltages for melting steel and for refining. Heat losses and electrodes are considered. Report submitted to Assn. Iron & Steel Elec. Engrs.

Resistance-Type. Electric Resistance Furnaces, E. P. Barfield. Elec. Rev. (Lond.), vol. 89, no. 2286, Sept. 16, 1921, p. 364. Discusses heat treatment of steel by electricity and other applications, power cost, etc.

Resistance Type Electric Furnace in the Melting of Brass and Other Non-Ferrous Metals, T. F. Baily. Am. Electrochemical Soc., advance paper, no. 20, for Meeting, Sept. 29–Oct. 1, 1921, pp. 273–279. Discusses various features to be considered, and summarizes advantages and disadvantages of resistance-type as compared with other types.

Rotary. Rotary Electric Furnace Shows Marked Advantages, Alan D. Dauch. Elec. Wld., vol. 78, no. 12, Sept. 17, 1921, pp. 565–566, 2 figs. This furnace replaces oil-fired furnaces for continuous heat treating, annealing and carbonizing.

Superheats in. Superheats in the Electric Furnace, George K. Elliott. Foundry, vol. 49, no. 18, Sept. 15, 1921, pp. 714–719. Discusses temperature losses, temperature limit for cupola iron, deoxidation, limits of sulphur, etc.

Types. Electric Furnaces, Ezer Griffiths. Beama, vol. 9, nos. 2 and 3, Aug. and Sept. 1921, pp. 145–150, 5 figs., and 254–259, 4 figs. Describes carbon-resistor furnace, vacuum furnace, furnaces for testing refractories and for experiments under high gaseous pressures; arc, induction high-frequency induction and vacuum cathode ray furnaces.

ELECTRIC LOCOMOTIVES

Operating Characteristics. Operating Characteristics of the Electric Locomotive, N. W. Storer. Ry. Rev., vol 69, no. 6, August 6, 1921, pp. 169–173, 5 figs. Discusses changes due to general adoption of electrification and adaptability of electric locomotives.

Swiss. Electric Locomotives of the Bernese Railway (Locomotives électriques des chemins de fer Bernois), Lucien A.-H. Pahin. L'Industrie Electrique, vol. 30, no. 701, Sept. 10, 1921, pp. 328–331. Data on 2-4+4-2 locomotives of 8000 kg. tractive effort, also mechanical and electrical equipment.

Electric Traction in Switzerland. Electrician, vol. 87, no. 2261, Sept. 16, 1921, pp. 348–352, 7 figs. Discusses freight-locomotive details, express locomotives 1-C-1 and 1-B+B-1, freight locomotive 1-C+C-1, and their electrical equipment. (Concluded.)

Vibration of. Diagram of the Vibrations of an Electric Locomotive with Coupling Rods (Diagramm der Schuttelschwingungen einer elektrischen Lokomotive mit Stangenantrieb), A. Wichert. Elektrotechnische Zeit., vol. 42, no. 17, Apr. 28, 1921, pp. 427–430, 2 figs. Torsion diagrams are presented which were taken on an electric locomotive with a single motor after it had been at work 18 months, and which, in author's belief, tend to confirm theories already advanced by him. Various vibrations, as shown on torsion diagram, are examined with view to tracing connection between their periodicity and other variables of problem.

Modern Theories on the Vibration Phenomena of Electric Locomotives with Parallel-Crank Drives (Neuere Theorien der Schuttelerscheinungen elektrischer Lokomotiven mit Parallelkurbelgetrieben), A. Wichert. Elektrotechnische Zeit., vol. 42, nos. 5, 6 and 7, Feb. 3, 10 and 17, 1921, pp. 103–107, 128–132 and 151–154, 19 figs. Gives mechanical analysis and criticism of observations and data made by seven different European authors on complex problems of vibrations of rod-driven electric locomotives. Viewpoints of different writers in their attempt to analyze and remedy dangerous vibrations on such drives.

ELECTRIC WELDING

Oil Tanks. Electric Welding of Oil Storage Tanks, William Schenstrom. Welding Engr., vol. 6, no. 9, Sept. 1921, pp. 49–52, 7 figs. Discusses advantages of welded over riveted, and need for standardized methods. Paper read before Am. Welding Soc.

ELECTRIC WELDING, ARC

Electrodes. Electric Arc Welding With Metal Electrode (Lysbuesvejsning med Metalelektroder), J. Clausen. Teknisk Tidsskrift (Elektroteknisk), vol. 17, no. 32, August 10, 1921, pp. 117–122, 4 figs. Reviews development of this method and discusses quality of electrodes, power required and efficiency of weld. (To be continued.)

ELECTRON METAL

See MAGNESIUM ALLOYS, Electron Metal.

ELEVATORS

Electric. Electric Elevator Machinery—Elevator Cables, Their Care and Inspection, M. A. Myers. Power, vol. 54, no. 10, Sept. 6, 1921, pp. 369–371, 7 figs. Types of elevator rope, machines and accessories. Cable measurement.

Motor-Control Equipment. Motor-Control Equipment Used in Elevator Service—I, G. J. Kirkgasser and E. W. Seeger. Elec. Rev. (Chicago), vol. 79, no. 13, Sept. 24, 1921, pp. 465–468, 8 figs. Machines, roping, brakes and motors employed in operation of elevators; features of magnetic and mechanical controllers; diagrams and illustrations of circuits and control devices. (To be continued.)

EMPLOYMENT MANAGEMENT

Employment System. A Modern Factory Employment System, W. H. Rohr. Wood-Worker, vol. 40, no. 7, Sept. 1921, pp. 27–29, 8 figs. Discusses the question of reducing labor turnover.

Hiring System. Efficient System of Hiring Men, Russel J. Waldo. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 135–137, 7 figs. Methods adopted by large manufacturing plant for insuring selection of applicants best suited for work.

ENGINEERS

Education and. Making Better Engineers of College Men. Elec. Wld., vol. 78, no. 12, Sept. 17, 1921, pp. 567–569. Power to think is more important than mind filled with facts.

The Character of the Engineer. Times Eng. Supp., no. 563, Sept. 1921, p. 259. Discusses natural qualifications and education as training. Believes there is room for all really fit.

ETHYLENE

Preparation from Acetylene. The Preparation of Ethylene by Hydrogenation of Acetylene, William H. Ross, James B. Culbertson and J. P. Parsons. Jl. Industrial & Eng. Chem., vol. 13, no. 9, Sept. 1921, pp. 775–778, 3 figs. Discusses preparation

of nickel catalyst, apparatus and method, adsorption of hydrogen, formation of ethane, yield of ethylene, and methods of analysis.

EVAPORATORS

Design. Studies in Evaporator Design—V, W. L. Badger. Chem. & Met. Eng., vol. 25, no. 10, Sept. 7, 1921, pp. 459–463, 5 figs. Experimental data for horizontal-tube evaporator showing relation between hydrostatic head, temperature drop and heat transmission.

EXTRUSION OF METALS

Extrusion Defect. The Extrusion Defect, R. Genders. Inst. Metals advance paper for meeting Sept. 21–22, 1921, no. 7, 9 pp., 12 figs.; also Engineering, vol. 112, no. 2909, Sept. 30, 1921, pp. 487–489, 12 figs. Describes method which is said to be successful in avoiding formation of extrusion defect, and is in use in many places for production of tubes and rod from soft metals such as lead and aluminum. Writer suggests its use for extrusion of copper alloys.

F

FACTORIES

Hygienic Arrangements. Modern Industrial-Hygienic Arrangements for Factories (Zeitgemässe gewerbehygienische Einrichtungen für Fabrikbauten), Otto Brandt. Betrieb, vol. 3, no. 23, Aug. 27, 1921, pp. 728–738, 22 figs. Points to necessity of maintaining pure air in work rooms. Most dangerous kinds of dust found in industrial works are visualized with aid of photomicrographs, and installations for removal of dust, smoke, gases, vapors, and arrangements for supplying moisture to air are described. In connection with dust-removal plants, installations for recovery of valuable kinds of dust from dust-laden air and metallurgical gases are discussed.

Layout. Production Plans and Layout of Factories (Fabrikbauten und Umstellungen), Otto Hardung. Betrieb, vol. 3, no. 24, Aug. 27, 1921, pp. 751–759, 6 figs. Determination of working periods, dimensions, required machines and materials, based on complete production plant in a new system and separate working systems. Discusses desiderata for selection of factory site and layout.

Maintenance. Factory and Plant Maintenance—II, Arnold A. Arnold. Mech. World, vol. 70, no. 1811, Sept. 16, 1921, pp. 222–223. Discusses various works plans that it may be advisable to keep and information they record, also inventory of machinery and plant. (To be continued.)

FLAME PROPAGATION

Definition. Flame, C. A. French. Jl. Soc. Automotive Engrs., vol. 9, no. 3, Sept. 1921, pp. 182–185 and (discussion) 185–188, 1 fig. Discusses definition of atomic theory, combustion, oxidation and flame propagation.

FLIGHT

Circling. Control in Circling Flight, F. H. Norton and E. T. Allen. Natl. Advisory Committee For Aeronautics, Report no. 112, 22 pp., 52 figs. Results of investigation for the purpose of developing instruments that would record forces and positions of all three controls and to obtain data on behavior of an airplane in turns.

FORGINGS

Ordnance, Heat Treatment of. Observations Made in the Heat Treatment of Ordnance Forgings, Paul E. McKinney. Trans. Am. Soc. for Steel Treating, vol. 1, no. 12, Sept. 1921, pp. 738–745, 3 figs. Shows the necessity of having most complete data on material handled for successful heat treatment and to avoid erroneous deductions.

Press. A Method of Designing Press Forgings, W. R. Ward. Forging & Heat Treating, vol. 7, no. 8, August 1921, pp. 428–430. Combination of practical and theoretical gives best results working from finished forging back to billet.

FOUNDRIES

Core Rooms. Improved Core Output from Smaller Space. Iron Age, vol. 108, no. 15, Oct. 13, 1921, pp. 927–929, 4 figs. By providing improved working conditions for girl core makers, better product and higher type of employee have been secured.

Electric Suspension Travelers. Electric Suspension Traveller in Foundries, Richard Hänchen. Eng. Progress, vol. 1, no. 5, May 1920, pp. 181–185, 10 figs. Describes types made by various manufacturers.

Ford Motor Co. New Ford Foundry Plant at River Rouge, L. B. Breedlove. Iron Age, vol. 108, no. 13, Sept. 29, 1921, pp. 787–793, 7 figs. Laid out for quantity production. Uses direct blast-furnace metal mixed with cupola metal in definite proportions as required. Conveyor systems highly developed.

Malleable Iron. Equipment Features Malleable Shop, H. E. Diller. Iron Trade Rev., vol. 69, no. 15, Oct. 13, 1921, pp. 935–942 and 950, 14 figs. Details of new foundry of American Chain Co., New York, located at York, Pa., showing radical departures from general practice in all three stages of conveying, melting and annealing.

Manufacturing System. Manufacturing System Applied to the Foundry. Machinery (Lond.), vol. 18, no. 466, Sept. 1, 1921, pp. 664–671, 20 figs. Review of system developed by Derwent Foundry Co. (1920), Ltd., Derby.

Mixtures. Figuring the Charges for Foundry Irons, V. A. Dyer. Iron Age, vol. 108, no. 15, Oct. 13, 1921, pp. 931–933. Iron mixtures and how to figure them chemically. Classification of castings and suggested analyses.

Steel. Detroit Steel Casting Company Plant, H. M. Lane. Blast Furnace & Steel Plant, vol. 9, no. 9, Sept. 1921, pp. 522–524, 6 figs. Describes recent additions to equipment to modernize plant.

Steel Foundry Makes Sugar Mill Machinery—I, James J. Zimmerman. Blast Furnace & Steel Plant, vol. 9, no. 9, Sept. 1921, pp. 536–540, 3 figs. Discusses milling or rolling equipment and its proper selection.

FREIGHT HANDLING

Automatic Unloading Devices. The Economy of Modern Automatic Unloading Devices in Railroad Transportation (Ueber die Wirtschaftlichkeit moderner Selbstentladevorrichtungen im Eisenbahntransportwesen), Hartwig Orenstein. Fördertechnik u. Frachtverkehr, vol. 14, nos. 15, 16, 17 and 18, July 22, Aug. 5, 19 and Sept. 2, 1921, pp. 171–174, 186–189, 205–208 and 221–224, 27 figs. Technical part: Development of types of automatic unloaders and wagon-tipping devices; operating conditions; loading and unloading plants. Economical part: Calculation of an example; costs and their variability; formula is developed and its application under different conditions explained.

Slow Traffic. On the Question of Slow-Freight Traffic, W. H. Williams. Bul. International Ry. Assn., vol. 3, no. 8, August 1921, pp. 1087–1101, 2 figs. Discusses loading and unloading, yard and train operation, freight car movement, freight rates, etc.

FUELS

Coke Breeze as Boiler Fuel. Value of Mixture of Coke Breeze and Bituminous Coal as Fuel for a Hand-Fired Boiler, John Blizard and James Neil. Jl. Am. Soc. Heating & Ventilating Engrs., vol. 27, no. 6, Sept. 1921, pp. 645–655, 2 figs. Tests carried out by Bur. of Mines show that mixtures of coarser coke breeze with Pittsburgh coal gave less than one-half the smoke given out by Pittsburgh coal alone, about 20 per cent less steam, and require stronger draft to burn them; steaming value is about 70 per cent that of Pittsburgh run-of-mine coal, and its price should be less than 70 per cent that of Pittsburgh coal. Finer coke breeze can be recommended only for use at low rates of combustion.

Influence on Engine Performance. The Influence of Various Fuels on Engine Performance—V, H. R. Ricardo. Automotive Industries, vol. 45, no. 5, August 4, 1921, pp. 211–216, 11 figs. Relation between mixture strength and indicated mean pressure for various fuels, compression ratios and spark timing is shown and influence of jacket water temperature and heating of charge determined. From preliminary report conducted for Asiatic Petroleum Co.

Mixed Culm and Pitch. Mix Culm and Pitch in New Fuel, Donald Markle. Iron Trade Rev., vol. 69, no. 12, Sept. 22, 1921, pp. 753–755. New heating material prepared by mixing anthracite coal and pitch; designed for use in blast furnace and metallurgical operations and for domestic heating. By-products are limited. (Abstract.) Paper presented before Am. Inst. Min. & Metallurgical Engrs.

Smokeless. The Present Position of Smokeless Fuels, F. S. Sinnatt. Iron & Coal Trades Rev., vol. 103, no. 2790, August 19, 1921, p. 233. Concludes that manufacture of some type of smokeless fuel would solve the problems of fuel conservation, air pollution and efficient house heating; coal should be worked at pithead or in conjunction with coal gas. (Abstract.) Paper read before Royal Sanitary Inst.

[See also OIL FUEL; PULVERIZED COAL.]

FURNACES

Preheated-Air vs. Direct-Fired. Experimental Comparison of a Preheated Air Furnace With a Direct Fired Furnace, L. Lellep. Am. Gas Jl., vol. 115, no. 12, Sept. 17, 1921, pp. 247–252 and 260–263, 4 figs. Discusses results of experiments and gives table of theoretical computation of fuel saving due to preheated air compared with fuel consumption in a direct-fired furnace.

FURNACES, BOILER

Improvements. The Reconstruction of Steam-Boiler Furnaces and Their Auxiliary Equipment for Obtaining a Maximum Conservation of Fuel (Die Umstellung der Dampfkesselfeuerung und ihrer Nebeneinrichtungen zur Erzielung grösster Brennstoff-Ökonomie), H. Briem. Fördertechnik u. Frachtverkehr, vol. 14, no. 14, July 8, 1921, pp. 156–161, 9 figs. Deals with ash-removal installations; forced-draft furnaces; and electric boiler protection.

Recovery of Unburned Fuel from Refuse. The Recovery of Unburned Fuel from Boiler Furnace Refuse, Thomas Fraser and H. F. Yancey. U. S. Bur. Mines Reports of Investigations serial no. 2281, Sept. 1921, 3 pp. Washing tests made in laboratory of mining department of University of Illinois show possibility of recovering unburned fuel by crushing refuse to ¾-in. ring size, washing on coal-washing tables, and removing slime from washed product by a dewatering conveyor-elevator or screen.

FURNACES, HEATING

Regenerative. Employ Regenerative Furnaces, E. C. Kreutzberg. Iron Trade Rev., vol. 69, no. 11, Sept. 15, 1921, pp. 680–683, 7 figs. Installation at Harrison, N. J., comprises 24 units, to burn either oil or gas. Operation is explained and results of tests are given.

FURNACES, HEAT-TREATING

Automatic Semi-Cylindrical. New Heat-Treating Furnace. Iron Age, vol. 108, no. 11, Sept. 15, 1921, p. 665, 1 fig. Automatic furnace, known as semi-cylindrical type, developed by Gen. Elec. Co., said to insure quick heating.

Rotary. Rotary Furnace for Automobile Parts, A. D. Dauch. Iron Age, vol. 108, no. 11, Sept. 15, 1921, pp. 666–667, 4 figs. Moving hearth is an annular ring; heated electrically, and controlled automatically; suitable for large variety of parts. Installed at plant of Nash Motors Co., Kenosha, Wis.

FURNACES, HOT-AIR

Small Blowers for. Small Blowers in Combination with Furnaces for Domestic Heating Plants, F. R. Still. Jl. Am. Soc. Heating & Ventilating Engrs., vol. 27, no. 6, Sept. 1921, pp. 659–663, 2 figs. Describes type of air-blast inductor and its application to hot-air furnaces.

G

GAGES

Snap. Tools Used in the Manufacture of P & W Adjustable Limit Snap-Gage, Ellsworth Sheldon. Am. Mach., vol. 55, nos. 11 and 12, Sept. 15 and 22, 1921, pp. 428–431 and 456–460, 24 figs. Sept. 15: Accurate alignment a prime requisite. Tool that drills a "cut-out" or crescent-shaped hole. Sept. 22: Making measuring anvils; accurate grinding operations; an ingenious lapping device.

Thread. New Type of Thread Gages, B. M. W. Hanson. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 110–111, 3 figs. Describes accurate method of determining correctness of screw threads by vision as well as by touch.

GALVANIZING

Metal-Spray Process. The Metal Spray Process and Its Use in Shipbuilding and Other Industries (Das Metallspritzverfahren und seine Anwendung in Schiffbau und anderen Industrien). Schiffbau, vol. 22, no. 48, Aug. 31, 1921, pp. 1238–1241, 4 figs. Discusses process, and its advantages in shipbuilding technique.

Processes. Metal Coatings as Protection Against Rust (Metallüberzüge als Rostschutzmittel), Werner Lange. Zeit. für Metallkunde, vol. 13, no. 7, Apr. 1921, pp. 161–170, 26 figs. Evaluation of different galvanizing processes, based on corrosion tests carried out by German military authorities during war.

GAS TURBINES

Aeronautical. Turbines and Kindred Problems in Aeronautics (Turbinen und verwandte Probleme in der Flugtechnik), W. G. Noack. Zeitschrift für Flugtechnik u. Motorluftschiffahrt, vol. 11, no. 14, July 31, 1920, pp. 201–207, 8 figs. Investigation of extent to which turbine can be considered as a motor for aircraft, and what prospects exist of applying the driving principle of the turbine, namely, the conversion of the energy of flow into mechanical work, in a more direct manner than is the case with the turbine for forward drive. (To be concluded.)

Holzwarth. The Internal-Combustion Turbine, Mark Meredith. Oil Field Eng., vol. 23, no. 9, Sept. 1921, p. 130. Describes "Holzwarth" oil turbine now being tested at works of Thyssen & Co., Germany; develops 500 hp. at 3,000 r.p.m.

Oil and Gas Turbines. Gas and Oil Turbines (Die Gas- und Oelturbine), W. Schüle. Elektrotechnische Zeit., vol. 42, nos. 29 and 30, July 21 and 28, 1921, pp. 777–784 and 821–824, 12 figs. Some of greatest difficulties in design of gas turbines are enumerated, and author proves by actual tests and operating results that all these problems have been solved and that gas or oil turbines represent serious competitor with steam turbine for either stationary, railway or ship-propulsion purposes. Test data of 500-kw. oil turbine are given.

GASOLINE

Absorption from Casinghead Gas. The Absorption of Gasoline From Casinghead Gas by Activated Charcoal, H. R. Auerswald. Mech. Eng., vol. 43, no. 9, Sept. 1921, pp. 601–602 and 606, 2 figs. Particulars regarding series of tests undertaken to evaluate process when applied to rich gas, with conclusions drawn therefrom as to its limitations.

Natural-Gas. Natural Gas-Gasoline Blends, D. B. Dow. U. S. Bur. Mines Reports of Investigations, serial no. 2279, Sept. 1921, 2 pp. Notes on how it is made. Includes table showing distillations of raw natural gas-gasoline, blending naphthas, and resulting blends.

GASOLINE ENGINES

Mixture Ratio and Temperature. The Effect of Mixture Ratio and Temperature on Power and Economy, C. S. Kegerreis. Automotive Industries, vol. 45, no. 13, Sept. 29, 1921, pp. 610–612, 5 figs. Tests conducted at Purdue Univ. show that marked gains in economy with but trifling loss in power result from proper heating of charge and correct mixture proportions.

GEARS

Compressive Stress. Gearing Calculations by the Compressive Stress Method—I, Joseph Jandasek. Automotive Industries, vol. 45, no. 11, Sept. 15, 1921, pp. 512–515, 15 figs. Maximum surface pressure, or compressive stress, must be considered if rate of wear of tooth is to be kept within proper limits.

Elliptical Wheels. The Design of Elliptical Wheels for a Constant Speed Reciprocating Motion—II, Osbert H. Nichols. Machinery (Lond.), vol. 18, no. 469, Sept. 22, 1921, pp. 754–756, 3 figs. Discusses proportions and effect of elliptical wheels, as used for modifying simple harmonic motion.

Helical. Cutting Rolling Mill Driving Gears. Machinery (Lond.), vol. 18, no. 470, Sept. 29, 1921,

pp. 787–790, 5 figs. Discusses production of large double helical gears by end-milling process.

Involute, Testing. Inspection of Involute Gear Hobs—II, Carl G. Olson. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 138–140, 6 figs. Methods used in examining test gears.

GRINDING

Automobile Parts. Grinding in the Automotive Industry—IV, P. M. Heldt. Automotive Ind., vol. 45, no. 9, Sept. 1, 1921, pp. 421–426, 12 figs. Discusses methods used in grinding crankshafts, flat faces, camshafts, gear teeth, splines and other parts. (Concluded.)

GRINDING MACHINES

Internal. Grinding Irregular-Shaped Holes on the Bryant Internal Grinding Machine. Am. Mach., vol. 55, no. 13, Sept. 29, 1921, pp. 499–500, 7 figs. Handling combinations of straight, tapered and curved internal surfaces. Grinding done in one operation. Laying out special control plates.

GUN MOUNTS

16-In. Disappearing Carriage. Design and Construction of the 16-in. Disappearing Carriage from an Engineer's Standpoint, G. M. Barnes. Mech. Eng., vol. 43, no. 10, Oct. 1921, pp. 659–660 and 674, 5 figs. Describes 16-in. high-power gun mounted on disappearing carriage, especially designed for seacoast-defense purposes; gun weighs 170 tons and carriage an additional 670 tons. Details of principal parts and forces acting on members of carriage, and recoil mechanism.

H

HANGARS

Concrete. The Hangar Near Tondern (Luftskibshallen ved Tönder), I. W. Unmack. Teknisk Tidsskrift (Elektroteknisk), vol. 45, no. 31, August 3, 1921, pp. 113–115, 5 figs. Reinforced concrete structure capable of housing two zeppelins. Details of construction and equipment.

Strauss Type. Airplane Shed with Special Roof and Door Construction. Eng. News-Rec., vol. 87, no. 14, Oct. 6, 1921, pp. 565–566, 2 figs. Quick-erection form of steel-roof-truss framing was adopted by designer, J. B. Strauss, and an adaptation of his well-known form of bascule bridge counterweighting was applied to pivoted door which forms one entire end of shed and is 21 ft. high and 100 ft. long.

HARDNESS

Testing. The Hardness Testing of Metals. Mech. Eng., vol. 43, no. 7, July 1921, pp. 445–449, 11 figs. Report of Committee of Engineering Division of Nat. Research Council on various methods of testing hardness of metals.

The Use of the Scleroscope on Light Specimens of Metals, Fred S. Tritton. Inst. Metals advance paper for meeting Sept. 21–22, 1921, no. 8, 10 pp., 4 figs.; also Engineering, vol. 112, no. 2909, Sept. 30, 1921, pp. 492–493, 4 figs. Results of experiments show that usual methods of supporting light specimens of metal for scleroscope test do not give results with accuracy which can be obtained when specimens are supported by methods described.

HEALTH

Plant Medical Department. Practices and Functions of the Medical Department, Robert E. Andrews. Indus. Management, vol. 62, no. 4, Oct. 1921, pp. 206–211, 6 figs. Experiences and procedure in medical department of large textile industry.

HEAT

Dissipation Coefficients of Iron and Copper. Determination of Heat-Dissipation Coefficients (Verfahren zur Bestimmung von Wärmeabgabekoeffizienten), K. Lubowsky. Elektrotechnische Zeit., vol. 42, no. 4, Jan. 27, 1921, pp. 79–81, 4 figs. Heat-dissipation coefficients of iron and copper bodies, in air and in oil, stationary and in motion influenced by different paints and insulating materials, are determined in watts per sq. cm. for 1 deg. cent. temperature rise. Account of test. Curves and tables, giving test data obtained, are included.

HEAT TRANSMISSION

Buildings. Heat Loss Through Various Types of Building Construction, L. A. Scipio. Jl. Am. Soc. Heating & Ventilating Engrs., vol. 27, no. 6, Sept. 1921, pp. 637–643, 2 figs. Results of series of experiments carried out to determine heat losses from different wall constructions for residence buildings, for which five houses exactly similar with exception of wall material and construction were built and heated by electric stoves for observation.

Furnaces, Losses in. Principles of Heat Loss in Furnaces, P. Rosin. Forging & Heat Treating, vol. 7, no. 8, August 1921, pp. 425–428, 1 fig. Study of heat losses through a furnace wall consisting of at least two different parts, a refractory material and an insulating material. Extract of article from "Metall und Erz."

Liquids. Numerical Laws of Heat Transmission Between Liquids in Industrial Heat Exchangers (Lois numériques de la transmission de la chaleur entre les fluides dans les echangeurs industriels), H. Dieterlen. Chaleur et Industrie, vol. 2, no. 16, August 1921, pp. 494–500, 4 figs. Discusses various formulas in use and finds them contradictory. (Continuation of serial.)

Problems. Solution of Heat Transfer Problems, H. G. Nevitt. Power Plant Eng., vol. 25, no. 17, Sept. 1, 1921, pp. 849–850, 1 fig. Discusses chart for determining mean temperature difference in a heat-transfer problem when initial and final temperature differences are known.

HEAT TREATING

Oil-Burning System. Screw Stock Heat Treated With Oil, F. J. Ryan. Iron Age, vol. 108, no. 11, Sept. 15, 1921, pp. 660–661, 3 figs. Application of Mires system to ferrous and non-ferrous material by Bridgeport Screw Co. Operating data.

HEATING, STEAM

Boiler Improvements. Fuel Economy in Heating Service, A. Bement. Heat. & Vent. Mag., vol. 18, no. 9, Sept. 1921, pp. 36–38. Comments on present practice in down-draft boiler design with suggestions for improvements.

Vacuum. Vacuum Steam Heating (Vakuumdampfheizung), L. Silberberg. Zeit. des Vereines deutscher Ingenieure, vol. 65, no. 34, Aug. 20, 1921, pp. 898–901, 15 figs. Comparison of different methods of exhaust-steam heating. Description of vacuum heating, and its efficiency in practice. Experimental results.

HELICOPTERS

Types. Helicopters (Les Hélicoptères), L. Guguet. L'Aerophile, vol. 29, no. 13-14, July 1-15, 1921, pp. 209–213, 6 figs. Discusses Austrian army captive type, Oehmichen, Pateras, Pescara, and other types.

HYDRAULIC TURBINES

Installation. The Hydraulic Plant—II, N. L. Devendorf. Power, vol. 54, no. 14, Oct. 4, 1921, pp. 513–516, 6 figs. Types of turbine setting, forms of draft tube, effect of air leakage, vertical vs. horizontal turbines, thrust bearings, maintenance and repairs.

Pelton Wheels. An Experimental Study of the Effect of Roughness of Bucket Surface on the Efficiency of Pelton Wheel, Junzo Nakahara. Jl. Soc. Mech. Engrs. & Soc. Nav. Architects, Sept. 1921. (In Japanese.)

Reaction. Contribution to the Knowledge of Hydraulic Reaction Turbines (Contributo Allo Studio Delle Turbine Idrauliche A Reazione), R. Leonardi. L'Industria, vol. 35, nos. 13 and 14, July 15 and 31, 1921, pp. 296–298, 5 figs. and pp. 314–319, 5 figs. Discusses theory of turbines, especially performance curves. Discussion and calculation of efficiency.

Types. The Hydraulic Plant—I, N. L. Devendorf. Power, vol. 54, no. 13, Sept. 27, 1921, pp. 484–486, 4 figs. Methods of removing debris from water in high- and low-head plants, types of hydraulic turbine employed, their limitations and means for effecting regulation.

HYDROELECTRIC DEVELOPMENTS

Great Britain. Hydro-Electric Developments—I, F. Rowlinson. Beama, vol. 9, no. 3, Sept. 1921, pp. 224–230, 1 fig. Summarizes developments in North Wales, Scotland and Ireland.

HYDROELECTRIC PLANTS

Brazil. Sorocaba Hydro-Electric Plant in Brazil, H. P. Quick. Power, vol. 54, no. 15, Oct. 11, 1921, pp. 548–551, 6 figs. Development planned for 75,000 hp. in five 15,000-hp. turbines operating under a 600-ft. net effective head. Designed and put into successful operation by American engineers.

Kern River, Cal. Automatic Features of New Kern River Power Plant. Eng. News-Rec., vol. 87, no. 11, Sept. 15, 1921, p. 453. Reaction turbines for 810-ft. head have quickly changeable runners. Extensive automatic control equipment.

Manitoba, Canada. New Plant on Winnipeg River. Can. Engr., vol. 41, no. 10, Sept. 8, 1921, pp. 1, 6 and 8. Great Falls development to have capacity of 168,000 hp., with six 28,000-hp. units. Details of head gates, screens, hydraulic turbines, generators, transformers, switching apparatus and transmission lines.

Switzerland. Constructional Details of the Oberhasli Hydroelectric Works (Les dispositions constructives des usines hydro électriques de l'Oberhasli). Bulletin Technique de la Suisse Romande, vol. 47, no. 17, August 20, 1921, pp. 193–198, 7 figs. Discusses hydrographic conditions, construction of dams, reservoirs, etc. (To be continued.)

I

IMPACT

Stress Recorder. Fereday & Palmer's Patent Stress Recorder. Ry. Gaz., vol. 35, no. 7, August 12, 1921, pp. 283–285, 27 figs., partly on supp. pl. Describes an instrument for recording impact stresses on railway bridges by a train passing at high speed.

INDICATORS

Diagrams. Taking Indicator Diagrams, P. A. Baumeister. Power, vol. 54, no. 15, Oct. 11, 1921, pp. 551–552, 4 figs. Points out requirements and necessary steps for getting good indicator diagrams.

Steam-Engine, High-Speed. A New Design of High Speed Engine Indicator, Benno R. Dierfeld. Automotive Ind., vol. 45, no. 10, Sept. 8, 1921, pp. 471–473, 15 figs. German instrument employs steel pencil to trace extremely small diagram on soot-covered glass plate which is enlarged by use of microscope.

INDUSTRIAL MANAGEMENT

Factory Investigations. Economic Value of Factory Investigations, Albert A. Dowd. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 121–122. Gives examples of cost reductions resulting from investigations. Improved method of manufacturing a long rod. Notes on handling materials, inspection and salvage, time studies and assembling.

Gantt Charts. The Gantt Chart—III, Wallace Clark. Management Eng., vol. 1, no. 4, Oct. 1921, pp. 225–229, 4 figs. Its application to progress of work.

Intra-Plant Communication. A Development in Intro-Plant Communication, Donald McNicol. Management Eng., vol. 1, no. 4, Oct. 1921, pp. 235–237, 3 figs. Describes how printing telegraph may be employed to supplement telephone in solving problem of plant communication.

Objections Made to. Scientific Management—XXXI, Henry Atkinson. Eng. & Indus. Management, vol. 6, no. 11, Sept. 15, 1921, pp. 286–289. Examination of objections made against scientific management.

Production, Economics of. The Economics of Production—IV, V and VI, D. A. McCabe. Am. Mach., vol. 55, nos. 11, 12, 13 and 14, Sept. 15, 22, 29, and Oct. 6, 1921, pp. 419–420, 455–456, 497–498 and 539–540. Sept. 15: Causes of changes in demand. Sept. 22: Production and reduced demand. Sept. 29: Producer's job and profits. Oct. 6: Production and wages.

Production Methods. Modern Production Methods—XXI, XXII and XXIII, W. R. Basset. Am. Mach., vol. 55, nos. 11, 13 and 15, Sept. 15, 29 and Oct. 13, 1921, pp. 421–423, 501–505 and 604–608, 13 figs. Sept. 15: Graphic methods of control; when to use graphic charts and when not to; master charts. Sept. 29: Various uses of time studies; attitude of workman; some general rules for time-study observer. Oct. 13: Records of actual time studies of machine operations; fallacy of taking over-all times for standards.

Protection Control by Graphics, Fred R. Daniels. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 112–120, 14 figs. System employing graphic charts for controlling shop operations, in use in plant of Hopedale Mfg. Co., Milford, Mass.

Production Planning. Quality and Costs as Standards of Production (Güte und Kosten als Grundmassstäbe der Produktion), H. Basson. Betrieb, vol. 3, no. 22, Aug. 13, 1921, pp. 695–703, 12 figs. States that quality and cost of product are influenced by fitness of design and quality of materials used, as well as by accuracy of production, etc. Based on practical examples, errors in design, possibilities for economizing in material, and accuracy of production are discussed.

Works Organization, R. Waring-Brown. Eng. & Indus. Management, vol. 6, no. 14, Oct. 6, 1921, pp. 377–382, 9 figs. Production engineer's planning department in automobile factory.

Purchasing Organization. Purchasing Organization in Machine Works (Beitrag zur Frage der Einkaufsorganisation in Maschinenfabriken), E. Springorum. Betrieb, vol. 3, no. 21, July 25, 1921, pp. 682–687, 13 figs. Purchasing system is described according to which departments making use of purchased material share responsibility.

Routing. Routing Work in Factories for Series Production with Numerous Separate Parts and Erection Groups (Die Abwicklung der Werkaufträge in Fabriken für Serienfabrikation mit sehr vielen Einzelteilen und Montagegruppen), H. Fürstenau. Betrieb, vol. 3, no. 21, July 25, 1921, pp. 665–674, 10 figs. Describes system for smooth flow of production and gives examples of its application in manufacture of railway cars. It can be applied to manufacture of locomotives, motor plows, automobiles, ships, etc.

Charting Routing Losses. Factory, vol. 27, no. 3, Sept. 1921, pp. 328–329, 2 figs. Graphic method of locating source of trouble. Experience of Am. Optical Co.

Simplification. Simplification in Industry—VII, Howard Coonley. Factory, vol. 27, no. 3, Sept. 1921, pp. 317–319, 4 figs. How line was reduced from 17,000 to 610 items. Describes how simplification facilitated development of suitable budget of business and opened way to other advantages.

Small Shop. Organization and Management of the Small Shop—V, VI and VII, E. W. Leach. Am. Mach., vol. 55, nos. 11, 13 and 15, Sept. 15, 29 and Oct. 13, 1921, pp. 438–441, 513–516, and 592–595, 7 figs. Sept. 15: Production planning and control. Necessity and uses of sys em. Figuring shop capacity. Simple method of cost keeping. Sept. 29: Value of cost records; what profit should be based upon. Classification of material and labor accounts; overhead and what it consists of. Oct. 13: Filling customer's order; necessity of keeping records; efficiency in shipping room.

Stock-Record Keeping. Worth While Considerations in Stock Record Keeping, F. E. Merriam. Indus. Management, vol. 62, no. 4, Oct. 1921, pp. 199–205, 9 figs. Defines duties and scope of stock-record department, and its relation to management.

Tracing Materials. Making It Easy to Trace Materials, L. E. Dodd. Factory, vol. 27, no. 3, Sept. 1921, pp. 330–332, 5 figs. Plan for recording material in factory that readily permits tracing it back to its source or ahead to its ultimate destination. Developed in Optical Glass Plant of Nat. Bur. of Standards, Pittsburgh and Washington.

[See also MOTION STUDY.]

INDUSTRIAL ORGANIZATION

Knitting Mills. The Organization of Knitting Mills, Carle M. Bigelow. Management Eng., vol. 1, no. 4, Oct. 1921, pp. 193–198, 4 figs. Notes on solving problems of specialized industry.

INDUSTRIAL RELATIONS

Human Factor. The Human Factor in Industry—I,

Clarence H. Northcott. Indus. Management, vol. 62, no. 4, Oct. 1921, pp. 195–198. How the man grew above the machine.

INDUSTRIAL TRUCKS

Hydraulic. The L.A.C. Hydraulic Truck, George F. Zimmer. Eng. & Indus. Management, vol. 6, no. 14, Oct. 6, 1921, pp. 385–387, 3 figs. Describes truck consisting of a main and sub-frame, former supported by four wheels 9 in. in diam. and 3 in. wide. Hydraulic lifting device consists of two cylinders and operating valves, formed together in gun-metal casting.

INSPECTION

Delco System. The Delco Inspection System. Machinery (Lond.), vol. 18, no. 460, July 21, 1921, pp. 468–471, 8 figs. Description of methods used in tool and gage-designing department of Dayton Eng. Laboratories Co. and standards of gaging adopted.

INTERNAL-COMBUSTION ENGINES

Frictional Losses. Distribution of Frictional Losses in Internal Combustion Engines, E. P. Taylor. Gas & Oil Power, vol. 16, no. 192, Sept. 1, 1921, pp. 190–192. Describes a number of tests and concludes that the retardation method offers the advantages of accuracy and complete speed range with the disadvantage that values of friction are obtained under special conditions. (From Jl. Proc. Roy. Soc. of New South Wales.)

Fuel, Valves and Ignition. The Internal-Combustion Engine: Fuel, Valves, and Ignition, A. W. Bradbury. Mech. Wld., vol. 70, no. 1809, Sept. 2, 1921, p. 193. Discusses chemical and mechanical work done in combustion chamber. (To be continued.) From paper read before Inst. Mar. Engrs.

Fuels, Influence of. The Influence of Various Fuels on Engine Performance—VI, H. R. Ricardo. Automotive Industries, vol. 45, no. 10, Sept. 8, 1921, pp. 465–470, 6 figs. Outlines tests intended to determine conditions which govern ease of starting with various fuels and effect of fuel upon volumetric efficiency. (To be continued.) From preliminary report conducted for Asiatic Petroleum Co.

The Influence of Various Fuels on the Performance of Internal Combustion Engines—VII, H. R. Ricardo. Automobile Engr., vol. 11, no. 153, August 1921, pp. 279–284, 5 figs. Gives tables of fuel characteristics and experimental results for variable compression engines.

Two- and Four-Cycle. The Internal Combustion Engine Discussed, A. W. Bradbury. Power House, vol. 14, no. 17, Sept. 5, 1921, pp. 32–36, 14 figs. Discusses two-cycle and four-cycle types, their advantages and disadvantages. Read before Inst. Mar. Engrs.

[See also AEROPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GASOLINE ENGINES; OIL ENGINES.]

IRON

Stainless. Stainless Iron. Times Eng. Supp., no. 563, Sept. 1921, p. 257. A variant of stainless steel, mechanical properties, corrosion and errosion.

IRON AND STEEL

Microscopic Examination. Microscopic Examination of Iron and Steel. Chem. & Met. Eng., vol. 25, no. 10, Sept. 7, 1921, pp. 471–472. Report of committee appointed by Am. Soc. for Testing Materials on methods for testing iron and steel.

L

LABOR TURNOVER

Causes. Why Men Quit, H. L. Keely. Indus. Management, vol. 62, no. 4, Oct. 1921, pp. 223–227, 3 figs. Simple method of recording caused, classifying them, and making record of practical use to management.

LATHES

Bench. Bench Lathes and Millers as Production Tools. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 130–134, 9 figs. Examples of work regularly manufactured on bench machines by B. C. Ames Co., Waltham, Mass.

Large. A Very Large Lathe. Engineer, vol. 132, no. 3430, Sept. 23, 1921, pp. 325–326, 3 figs., two on supp. plate. Describes sliding, surfacing and screw-cutting lathe built by Thomas Shanks & Co., Johnstone. Principal dimensions are: Height of centers without packing, 111 in.; and with packing, 123 in.; admit between centers, 40 ft.; width of slide bed, 18 ft. 6 in.; overall length of bed, 60 ft.; diam. of face-plate, 15 ft.; main motor, 120 hp.

Motor-Driven Heavy. Recent Machine Tool Developments—XXI, Joseph Horner. Engineering, vol. 112, no. 2906, Sept. 9, 1921, pp. 364–367, 12 figs. Motor-driven heavy lathe of 20-in. centers, constructed by Francis Berry & Sons, Sowerby Bridge, England.

Turret. Improving Tool Equipments, Hubert Bentley. Eng. & Indus. Management, vol. 6, no. 10, Sept. 8, 1921, pp. 265–266, 3 figs. Describes hexagon turret toolholder, use of which, it is claimed, increases productivity of machine and prolongs life of tool.

Production Work in the Locomotive Shop—I. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 102–105, 10 figs. Application of Bullard vertical turret lathe to locomotive-shop practice, with typical examples and description of tooling for each job.

10-In. Automatic Turret Lathe. Engineering, vol. 112, no. 2909, Sept. 30, 1921, pp. 463–467, 44 figs. partly on supp. plate. Details of automatic turret lathe constructed by Gisholt Machine Co., Madison, Wis. Swing of lathe is 20 in., maximum distance between chuck and turret is 45 in. and maximum length of work which can be handled 14 in.; overall length, 11 ft. 10⅝ in.; weight, 10,100 lb. It can be driven by electric motor or belt.

Vertical. An Original Type of Lathe. Eng. Production, vol. 3, no. 49, Sept. 8, 1921, pp. 219–220, 1 fig. Details of vertical lathe made by Cadillac Tool Co., Detroit, which can be used for turning, facing and grooving operations.

LIQUIDS

Viscosity. Effect of Temperature on the Viscosity of Liquids (Influence de la température sur la viscosité des liquides normaux), Edm. van Aubel. Comptes Rendus des Séances de L'Académie des Sciences, vol. 173, no. 7, August 16, 1921, pp. 384–387. Gives new formula and shows that it is accurate with normal liquids.

LOCOMOTIVES

Booster Tests. Booster Tests on Temiskaming & Northern Ontario. Ry. Age, vol. 71, no. 10, Sept. 3, 1921, pp. 447–448, 4 figs. Results of tests of locomotive boosters show 20 per cent increased freight tonnage and rapid acceleration of passenger trains.

British. The Comparison of Dimensions and Proportions of British Locomotives, E. C. Poultney. Ry. Mech. Engr., vol. 95, no. 9, Sept. 1921, pp. 539–542, 1 fig. Discusses factor of adhesion, rated tractive effort, boiler factor, factors of combustion, firebox volume, efficiency, etc. (To be continued.)

Coaling Stations. Concrete Coaling Station. Engineer, vol. 132, no. 3428, Sept. 9, 1921, pp. 271–273, 3 figs. Plant of moderate size built at engine yard and running sheds of Phila. & Reading R. R., Philadelphia. Conveyor is intermittent vertical hoist, with single bucket of 3 tons capacity; both coal and sand for engines are handled by same apparatus. Reinforced-concrete structure consists of tower with hoisting shaft and a 600-ton storage bin which span two lines of rails.

New Coaling Stations on the Santa Fe. Ry. Elec. Engr., vol. 12, no. 9, Sept. 1921, pp. 334–337, 5 figs. Description of 400-ton reinforced-concrete automatic electric coaling and sanding plant permitting continuous operation of buckets.

Design and Operation. The Necessity for Improvement in the Design and Operation of Present-Day Locomotives, H. W. Snyder. Mech. Eng., vol. 43, no. 7, July 1921, pp. 455–458, 1 fig. Brief discussion of engine problems, followed by consideration of design of main and side rods and crankpins to withstand tremendous piston thrust to which they are subjected in large engines; problem of counterbalancing; frame design and cross-bracing; driving-box brasses; ashpan design, lubrication, etc.

4-6-0 Express Goods. Four-Cylinder Express Goods Locomotives on the Great Central Railway. Ry. Gaz., vol. 35, no. 10, Sept. 2, 1921, pp. 368–369, 2 figs. Type 4–6–0, tractive effort 29,507 lb. at 85 per cent boiler pressure.

4-6-0 Three-Cylinder. New Three-Cylinder 4–6–0 Type Locomotives, Caledonian Railway. Ry. Gaz., vol. 35, no. 13, Sept. 23, 1921, pp. 463, 2 figs. on page 464. Three 8½-in. single-expansion cylinders, six coupled wheels of medium diameter, and 60 tons of adhesion.

Freight. Advantages of Large Freight Locomotives, Particularly the 2-10-2 Type, Albert F. Stuebing. Mech. Eng., vol. 43, no. 7, July 1921, pp. 459–460. Points out more important considerations involved in study of economic value of various types of motive power and demonstrates complexity of problem.

Liquid Fuel. On the Utility of Studying the Question of the Use of Liquid Fuel in Locomotives, Henry Fowler. Bul. International Ry. Assn., vol. 3, no. 8, August 1921, pp. 923–976, 11 figs. Discusses a number of questions sent to R. R. administrations on their using liquid fuel and gives tabulated statement of replies received.

Mikado. New Locomotives for the Missouri Pacific Ry. Age, vol. 71, no. 11, Sept. 10, 1921, pp. 495–498, 4 figs. Data on Mikado type equipped with booster, switcher, Pacific and mountain types.

Oil Firing. Oil-Firing on English Railways, E. C. Bowden-Smith. Petroleum Times, vol. 6, no. 139, Sept. 3, 1921, pp. 617–618, 1 fig. Describes working of a Great Central tank locomotive burning oil.

Superheater. Three-Cylinder Superheated Steam Goods Train Locomotive. Type 2–10–0, G. Heise. Eng. Progress, vol. 1, no. 5, May 1920, pp. 191–195, 25 figs. Describes types built by Lokomotiv-Bauanstalt Henschel & Sohn.

2-8-0 Belgian State Railways. Powerful New 2–8–0 Type Locomotives For the Belgian State Railways. Ry. Gaz., vol. 35, no. 7, August 12, 1921, pp. 286–287, 5 figs. Built by Armstrong, Whitworth & Co., for mixed traffic; develops tractive force of 45,820 lb.

Weighing Plant. A Large Capacity Locomotive Weighing Plant, Carl C. Bailey. Ry. Age, vol. 71, no. 10, Sept. 3, 1921, pp. 453–455, 5 figs. Heavy scale is housed in special building with equipment for determining wheel loads.

LUBRICATION

Car Journals. Lubrication of Car Journals Without the Use of Waste. Ry. Rev., vol. 69, no. 9, August 27, 1921, pp. 267–271, 6 figs. Particulars of tests conducted to determine relative advantages of splash-oil lubrication vs. waste-packed method.

M

MACHINE SHOPS

Design and Construction. The Design and Construction of Engineering Workshops—XXII, Ernest G. Beck. Mech. Wld., vol. 70, no. 1810, Sept. 9, 1921, pp. 202–203, 2 figs. Continuation of discussion on construction of roofs.

Haarlem, Holland. A Visit to the Haarlem Machine Works, Formerly Figee Bros. (Bezoek aan de fabrieksterreinen Noorder Buiten Spaarne van de Haarlemsche Machine-fabriek, voorheen Gebrs. Figee), P. J. Van Zwieten. De Ingenieur, vol. 36, no. 35, August 27, 1921, pp. 664–677, 23 figs. Describes development of works and some of its principal construction work carried out.

MACHINE-TOOL INDUSTRY

Influence of Automobile on. The Influence Exerted by the Automobile on the Machine-Tool Industry. Mech. Eng., vol. 43, no. 8, Aug. 1921, pp. 529–534, 1 fig. Group of papers by F. K. Hendrickson, Henry J. Eberhardt, Henry J. Hinde, Ralph E. Flanders and Chester B. Lord, dealing with changes brought about by automobile in machine-tool design, construction and operation, together with discussion of fundamentals of interchangeable manufacture.

MACHINE TOOLS

Special vs. Standard. Manufacturing with Special Machines vs. Standard Equipment—V, G. F. Jenks and M. H. Christopherson. Am. Mach., vol. 55, no. 12, Sept. 22, 1921, pp. 475–479, 12 figs. Lapping cylinders; testing and assembling. Comparison of machining times at Otis Works and Water town Arsenal.

MAGNESIUM ALLOYS

Electron Metal. The Magnesium Alloy "Electron," S. Beckinsale. Inst. Metals advance paper for meeting Sept. 21–22, 1921, no. 12, 2 pp. Note on results of examination of samples, of German origin, of magnesium alloy known as electron.

MALLEABLE IRON

American. American Malleable Cast Iron—XIX, H. A. Schwartz. Iron Trade Rev., vol. 69, no. 13, Sept. 29, 1921, pp. 813–816, 1 fig. Inspection and testing.

MANGANESE STEEL

Carbonizing. Carbonizing Manganese Steel, A. A. Blue. Forging & Heat Treating, vol. 7, no. 8, August 1921, pp. 413–415, 4 figs. States that increased manganese content produces greater sensitiveness to carbonizing.

MARINE ENGINES

Broken Propeller Blades. Examples of Broken Propeller Blades of Marine Engines, S. Sasaki. Jl. Soc. Mech. Engrs. & Soc. Nav. Architects, Sept. 1921. (In Japanese.)

MARINE STEAM TURBINES

Diaphragms. Turbine Diaphragms, H. M. David. Mech. Wld., vol. 70, no. 1809, Sept. 2, 1921, pp. 181–183, 7 figs. Examines question from mechanical and constructional point of view; discusses type applying more particularly to marine turbines of impulse type having double reduction gear.

Geared. Double-Reduction Gearing of the Three-Case Type for Steamships. Engineering, vol. 112, no. 2906, Sept. 9, 1921, p. 376, 2 figs. on supp. plate. Constructed by Scotts Shipbuilding & Eng. Co., Ltd., Greenock, England, for single-screw vessel; transmits 6000 shaft hp.; high-pressure and low-pressure turbines have speed of 3,000 and 18,000 r.p.m., respectively.

Angular Vibrations in Marine Propelling Machinery, Richard Gardner. Engineering, vol. 112, no. 2906, Sept. 9, 1921, pp. 363–364, 3 figs. Investigation of vibration effect in relation to geared steam-turbine installations. Proposes method for obtaining comparative estimates of outside limits to amplitude of vibration in gearing.

METAL SPRAYING

Schoop Process. The Schoop Process of Metal Spraying. Am. Mach., vol. 55, no. 16, Oct. 20, 1921, pp. 647–648, 6 figs. Protective coating of metal sprayed by compressed air. Impalpable particles discharged at high velocities penetrate pores. Variety of metals can be used.

METALLOGRAPHY

Etching. A New Etching Medium for Chrome and Tungsten Steels (Ein neues Aetzmittel für Chrom- und Wolframstähle), Karl Daeves. Stahl u. Eisen, vol. 41, no. 36, Sept. 8, 1921, pp. 1262–1264, 3 figs. Describes composition of new etching medium containing yellow prussiate of potassium, adapted to etching of high-speed tool steel, and other purposes.

The Electrolytic Etching of Metals, Frank Adcock. Inst. Metals advance paper for meeting Sept. 21–22, 1921, no. 11, 9 pp., 18 figs. Notes on citric acid solution; ammonium molybdate solution; method of etching cupro-nickel (80:20) so as to show both cores and grain boundaries. Notes on gold. Heat etching of platinum.

METALS

Alkaline. Experiences with the Alkaline and Alkaline Earth Metals in Connection with Non-Ferrous Alloys, Charles Vickers. Am. Electrochemical Soc. advance paper no. 14, for Meeting, Sept. 29–Oct. 1, 1921, pp. 191–198. Sodium, of the alkaline metals, is said to serve as suitable deoxidizing agent in producing copper castings of superior torsional

strength; calcium, of alkaline earth metals, when in combination with an acid element, as silicon, produces castings of good electrical conductivity.

Fatigue. The Fatigue of Metals, Clifford W. Nash. Commonwealth Engr., vol. 8, no. 12, [illegible] 1921, pp. 250–353. Discusses fatigue and [illegible] limit, endurance limit, mechanism of fatigue [illegible], and conditions favoring resistance to fatigue.

Rigidity and Viscosity. The Effect of Temperature on the Modulus of Rigidity, and on the Viscosity of Solid Metals, Kei Iokibe and Sukeaki Sakai. Lond., Edinburgh, and Dublin Philosophical Mag. & Jl. Sci., vol. 42, no. 249, Sept. 1921, pp. 397–418, 17 figs. Gives results of experiments carried out with 13 different metals to measure rigidity and logarithmic decrement at ordinary and high temperatures.

MICROMETERS

Accuracy. Checking the Accuracy of Micrometer Measurements, Ellsworth Sheldon. Am. Mach., vol. 55, no. 14, Oct. 6, 1921, pp. 562–564. Notes on close measurements with micrometer; possibilities of error due to mechanical defects.

Recording Ultra-. The Recording Ultra-Micrometer, John J. Dowling. Engineering, vol. 112, no. 2906, Sept. 9, 1921, p. 395, 1 fig. States that both in physical laboratory and engineering, measurement of minute strains, displacements, expansions and the like, can be carried out with a degree of refinement altogether out of proportion with simplicity and reliability of apparatus. All measurements can be made from a distance and can be recorded by a recording galvanometer if desired. Paper read before British Assn. at Edinburgh.

MILLING CUTTERS

Forged High-Speed. Characteristics of the Forged Milling Cutter, William G. Galkins. Am. Mach., vol. 55, no. 11, Sept. 15, 1921, pp. 424–427, 10 figs. Methods of manufacture. Results of casting and forging high-speed steel. Structure of metal. Comparison of bar stock and forged steel.

MOLYBDENUM STEEL

Constituents. On Constituents Found in Tungsten and Molybdenum Steels, Albert M. Portevin. Iron & Steel Inst. advance proof for meeting Sept. 5–6, 1921, no. 5, 4 pp., 6 figs.; also Engineering, vol. 112, no. 2906, Sept. 9, 1921, pp. 372–373, 6 figs. As results of systematic investigation of special steels author has been able to effect disappearance of obviously hard states (martensitic or austenitic), and to establish fact that certain structures which might have been regarded as being in equilibrium, are superseded by others which represent an even more advanced state of equilibrium.

MOTION STUDY

Photographic Apparatus for. Photographic Apparatus for Motion Study (Hilfsmittel fur Bewegungsuntersuchungen), R. Thun. Betrieb, vol. 3, no. 24, Sept. 5, 1921, pp. 771–779, 10 figs. Discusses motion pictures and photographic bases for time-motion studies. Describes apparatus for the taking and evaluation of motion pictures and compares two different kinds of motion photographs.

MOTOR PLOWS

German Ergomobil. The Ergomobil Motor Plow (Der Ergomobil-Motorseilpflug), A. Schilling. Oel- u. Gasmaschine, vol. 18, nos. 6, 7 and 8, June, July and Aug., 1921, pp. 96–97, 115–117 and 123–126, 15 figs. Details of rope-transmission plow with single-cylinder internal-combustion-engine drive, constructed by A. Borsig, Ltd., Berlin-Tegel.

Types. Motor-Driven Ploughs, Dr. Martiny. Eng. Progress, vol. 2, no. 8, August 1921, pp. 169–174, 21 figs. Discusses application of motor-driven plows; describes Stock, Wode, Hansa-Lloyd types.

MOTOR TRUCKS

Advantages. Trucks Pass the Tests of the Times, F. W. Fenn. Power Wagon, no. 202, September 1921, pp. 15–17 and 37. Gives figures showing decrease of horse traffic and increase of motor trucks, and gives examples of advantages of latter.

Dump Bodies. Making Dump Bodies for Motor Trucks. Iron Age, vol. 108, no. 15, Oct. 13, 1921, pp. 937–938, 2 figs. Specialized factory unit of Van Dorn Iron Works Co. arranged for convenience and economy in handling materials. Shipping room is abolished.

MOTORCYCLES

Engines. Machining Motor Cycle Engines. Eng. Production, vol. 3, no. 48, Sept. 1, 1921, pp. 205–210, 15 figs. Methods of J. A. Prestwich & Co., Ltd., Tottenham, London.

N

NICKEL ALLOYS

Nickel-Aluminum-Copper. The Properties of Some Nickel-Aluminium-Copper Alloys, A. A. Read. Inst. Metals advance paper for meeting Sept. 21–22, 1921, no. 1, 24 pp., 23 figs.; also Engineering, vol. 112, no. 2908, Sept. 23, 1921, pp. 453–456, 22 figs. Continuation of work described in Jl. Inst. Metals (vol. 11, no. 1, 1914, p. 169) in course of which a type of alloy was observed which, while extremely soft and ductile on quenching from 900 deg. cent., was considerably hardened by cooling. In present work the properties of alloys of this type are investigated more fully.

NOZZLES

Diffuser, Tests of. Tests with Diffusers ([Ueber Versuche mit Verdichtungsdüsen (Diffusoren)], August Riffart. Zeit. des Vereines deutscher Ingenieure, vol. 65, no. 35, Aug. 27, 1921, pp. 918–922, 44 figs. A diffuser is a wedge-shaped pipe section for conversion of flow velocity into pressure. Whereas in conversion of pressure into velocity efficiency of 96 to 98 per cent has been obtained, the reverse is possible only with great loss. Writer seeks to determine causes therefor based on phenomena of flow.

O

OIL ENGINES

Injection Type. The Rising Importance of Oil-Injection Type of Internal-Combustion Engine, Charles E. Lucke. Mech. Eng., vol. 43, no. 10, Oct. 1921, pp. 653–658 and 686, 24 figs. Review of development of internal-combustion engine from early gas-burning type to present-day injection engine capable of operating on any form of liquid fuel without explosive shock.

Marine. Some Observations on Marine Oil Engines, D. M. Shannon. Mech. Wld., vol. 70, no. 1808, August 26, 1921, pp. 163–164, 3 figs. Discusses systems of oil injection and states that for large marine engines the favorite mechanical injection system consists in having a common pressure main in which oil is kept at 3000 to 4000 lb. and to which all fuel valves are connected. (Continued.) Paper read before Inst. Mar. Engrs.

Piston Temperature Measurements. Temperature Measurements of Oil-Engine Pistons (Temperaturmessungen an Kolben von Oelmaschinen), W. Riehm. Zeit. des Vereines deutscher Ingenieure, vol. 65, no. 35, Aug. 27, 1921, pp. 923–925, 7 figs. Direct measurement of temperatures of uncooled pistons in Diesel engines under different operating conditions. Temperature distribution in piston heads of different shapes.

Still. Still Oil Engine for Marine Propulsion. Engineering, vol. 112, no. 2905, Sept. 2, 1921, pp. 344–345, 2 figs. Brief description of engine followed by extracts of report by deputation of French engineers of tests on experimental engine designed and built by Scotts' Shipbuilding & Eng. Co., Ltd., Greenock, England.

Vegetable-Oil Fuel. Using Vegetable Oils in Hot-Bulb Engines (Essais sur l'utilisation des huiles végétales dans les moteurs a boule chaude), M. Mathot. Bulletin Technique du Bureau Veritas, vol. 3, no. 7, July 1921, pp. 167–169. Results of tests show that with palm and cotton oil a hp-hour requires 265 grams in a 4-stroke 25-hp. engine, 320 grams in a 2-stroke 16-hp. engine, 285 grams in a 2-stroke 33-hp. engine, etc. Paper read before Association pour le perfectionnement du materiel colonial, at Brussels.

OIL FUEL

Chemical Research. The Role of the Chemist in Relation to the Future Supply of Liquid Fuel, Harold Hibbert. Jl. Industrial & Eng. Chem., vol. 13, no. 9, Sept. 1921, pp. 841–843. Discusses alcohol, saccharifying organisms, and sources other than alcohol. Read before Am. Chem. Soc.

Installations. The Installation of Oil as Fuel, Allen F. Brewer. Power, vol. 54, no. 10, Sept. 6, 1921, pp. 361–364, 1 fig. Suggestions for selection of suitable equipment.

Mexican. The Production and Combustion of Mexican Fuel Oil—V and VI, J. M. Pettingell and J. R. Carlson. Combustion, vol. 5, nos. 3 and 4, Sept. and Oct. 1921, pp. 110–114, 6 figs. and 168–175, 6 figs. Describes features common to oil-burning plants and successful practice; various types of burners and furnaces.

Production and Use. Fuel Oil: Its Production and Use, W. A. Whyte. Petroleum Times, vol. 6, no. 133, July 23, 1921, pp. 133–135. Discusses Mexican oils, physical tests, etc. (Concluded.)

Vegetation. Motor Fuel from Vegetation, T. A. Boyd. Jl. Industrial & Eng. Chem., vol. 13, no. 9, Sept. 1921, pp. 836–841, 6 figs. Discusses shale, benzene, alcohol and cellulose as sources of motor fuel. Read before Am. Chem. Soc.

OILS

Linseed. A Study on the Oil Bromide Test of Linseed Oil, Thomas A. Davidson. Jl. Industrial & Eng. Chem., vol. 13, no. 9, Sept. 1921, pp. 801–806. Finds that the centrifuge is most satisfactory for separating oil bromides from reaction mixture, and volatility of either proved no drawback.

Viscosity. Viscosity-Temperature Curves of Fractions of Typical American Crude Oils, E. W. Dean and F. W. Lane. Jl. Industrial & Eng. Chem., vol. 13, no. 9, Sept. 1921, pp. 779–786, 7 figs. Determines curves for products derived from Pennsylvania, California and Wyoming crude oils.

Viscosity of Engine Oils, O. W. Franke. Power Plant Eng., vol. 25, no. 17, Sept. 1, 1921, pp. 847–848. Greasy friction is essential for reciprocating engines.

OPEN-HEARTH FURNACES

Acid. Acid Open-Hearth Practice (Der saure Martinofenbetrieb). Stahl u. Eisen, vol. 40, nos. 34 and 35, Aug. 26 and Sept. 2, 1920, pp. 1129–1135 and 1165–1170, 15 figs. on supp. plate. Refers to two works by B. Vaneske, and J. H. Whiteley and A. F. Hallimond, respectively, in Jl. Iron & Steel Inst. (vol. 99, no. 1, 1919), both based on the physical-chemical phase rules. Notes on presence of ferric oxide in furnace; regulation of degree of acid in slag; addition of lime; physical conditions during smelting; removal of carbon due to oxidation through gas; reaction between metal and slag; etc. (To be concluded.)

Design. Open-Hearth Furnace Design, A. D. Williams. Iron Age, vol. 108, no. 12, Sept. 22, 1921, pp. 719–721, 6 figs. Reversing valves and their effect on efficiency. Chimney areas and heights.

P

PAINTS

White Lead. Paints, Painting and Painters, With Reference to Technical Problems, Public Interests and Health, Henry E. Armstrong. Jl. Roy. Soc. Arts, vol. 69, no. 3588, August 26, 1921, pp. 655–682 and (discussion) 682–685, 4 figs. Discusses suggested prohibition of white lead; volatilization of lead and turpentine; volatile constituents of paint removers; risks and dangers due to mechanical operation; etc. Is against government interference.

PATTERNS

Storage. The Organization of Pattern Stores, H. Varley. Eng. & Indus. Management, vol. 6, no. 14, Oct. 6, 1921, pp. 374–376, 3 figs. Account of organization of stores shows how economy in time, money and labor may easily be effected by introduction of suitable system.

PISTON RINGS

Design. Important Factors in Piston-Ring Design, H. H. Platt. Jl. Soc. Automotive Engrs., vol. 9, no. 3, Sept. 1921, pp. 195–197 and (discussion) 197–199, 1 fig. Discusses diagonal and lap joints, design for gas tightness, oil leakage.

POWER GENERATION

Steam, Fuel Economy in. Fuel Economy by the Adoption of Scientific Management in Steam Generation and Utilisation, David Brownlie. Eng. & Indus. Management, vol. 6, no. 14, Oct. 6, 1921, pp. 393–394 and 396. Discusses cause of losses in steam generation, low-temperature carbonization, and flue-gas analysis.

POWER PLANTS

Design. Developments in Power Station Design—VI–XI. Engineer, vol. 132, nos. 3426, 3427, 3428, 3429, 3430, 3431, Aug. 26, Sept. 2, 9, 16, 23 and 30, 1921, pp. 214–216, 8 figs., pp. 234–235, 7 figs., pp. 258–260, 8 figs., pp. 282–284, 9 figs., pp. 324–325, 5 figs. and pp. 336–338, 6 figs. Aug. 26: The Searab and Babcock oil burners. Sept. 2: The Thornycroft oil fuel burners; the White low-pressure system; the Lawton steam jet burner. Sept. 9: The Alldays & Onions, and White oil burners, and the Wilton burner for burning of all classes of liquid fuel. Sept. 16: Electrical distance thermometers and CO_2 recorders. Sept. 23: Describes Tozer retort for low-temperature carbonization of bituminous coal. Sept. 30: Tozer low-temperature carbonization power plant for South African Carbide & By-Products Co., Natal, with retorts, steam turbine and electric plant.

Economic Operation. The Economic Operation of Small Power Plants, Malcolm C. W. Tomlinson. Management Eng., vol. 1, no. 4, Oct. 1921, pp. 199–204, 4 figs. How to reduce wastage of coal, steam, water, electric power, and compressed air.

Evolution. Power-Plant Evolution, C. F. Hirshfeld. Mech. Eng., vol. 43, no. 9, Sept. 1921, pp. 575–578. Discusses decrease brought about in cost of producing electric power, and of possibilities of further increasing plant efficiencies by use of higher steam pressures, air preheating, improved methods of feedwater heating, etc.

Ford Plant, River Rouge. New Ford Power Plant at River Rouge, Thomas Wilson. Power, vol. 54, no. 9, Sept. 6, 1921, pp. 348–353, 9 figs. Plant featured by large double-ended boilers having 26,470 sq. ft. of steam-making surface and burning simultaneously blast-furnace gas and powdered coal; complete electrical system and unique substation layout.

Toledo, Ohio. Acme Power Plant at Toledo. Power, vol. 54, no. 12, Sept. 20, 1921 pp. 434–442, 13 figs. A 200,000-kw. ultimate-capacity generating station, of which 40,000 kw. in two units has been installed. Prominent features of station are said to be coal handling, water supply, boiler room with unusual facilities for metering and control, and switchhouse.

PRESSES

Spring-Clip, Manufacture. Press Tools for the Manufacture of Spring Clips, J. J. Holloway. Machinery (Lond.), vol. 18, no. 469, Sept. 22, 1921, pp. 765–766, 6 figs. Describes operation of each tool.

Uses. Cutting Costs with the Power Press, Edward K. Hammond. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 96–101, 9 figs. How material and labor are saved by use of power presses.

PROFIT SHARING

Disadvantages. Thrift Encouragement by Employers—IV, Leonhard Felix Fuld. Indus. Management, vol. 62, no. 4, Oct. 1921, pp. 214–215. Writer explains his objections to profit-sharing dividends.

PULVERIZED COAL

Advantages and Disadvantages. Commission on Fuel Utilization (Commission d'Utilisation du Combustible). Revue de L'Industrie Minérale, no. 15, August 1, 1921, pp. 514–519. Third report Minister of Public Works. Discusses firing with pulverized coal and summarizes advantages and disadvantages.

Application. Application of Pulverized Coal (Renseignements sur l'emploi du charbon pulvérisé), Pierre Appell. Chaleur et Industrie, vol. 2, no. 16, August 1921, pp. 510–512. Gives results of tests made in boiler burning 200 kg. per hour.

Boilers. Powdered Coal Under Steam Boilers—III, H. D. Savage. Coal Trade Jl., vol. 52, no. 38,

Sept. 21, 1921, pp. 1049–1050, 1 fig. Survey of results in large industrial plants establishes efficiency of pulverized-fuel combustion.

Colloidal Mixtures. Pulverised Coal and Colloidal Mixtures. L. C. Harvey. Eng. & Indus. Management, vol. 6, no. 11, Sept. 15, 1921, pp. 310–312. Discusses merits and general features of pulverized coal and its admixture with liquid fuel.

Furnaces for Electrical Works. Pulverized-Coal Furnaces for Electrical Works (Kohlenstaubfeuerungen für Elektrizitätswerke). Friedrich Münzinger. Elektrotechnische Zeit., vol. 42, no. 5, Feb. 3, 1921, pp. 97–103, 10 figs. Systematic review and critical investigation of prospects of different construction types of pulverized-coal furnaces, especially from operative and economic viewpoint. Notes on preparation plant; combustion of pulverized coal; and adaptability of pulverized-coal furnaces for stationary steam boilers. Abstract of book entitled Pulverized-Coal Furnaces for Stationary Steam Boilers, published by J. Springer, Berlin.

Plant. Development of a Powdered Coal Plant. Charles Longenecker. Blast Furnace & Steel Plant, vol. 9, no. 9, Sept. 1921, pp. 567–569. Discusses grade of coal, powdered-coal equipment and furnace changes.

PUMPS

Air-Lift. Experiments on Air Lift Pumping. John S. Owen. Engineering, vol. 112, no. 2908, Sept. 23, 1921, pp. 458–461, 9 figs. Describes experiments made with view to ascertaining most efficient design for air-lift pump, for lifting acid mine liquors in mine in San Domingos, Portugal. Describes installation finally adopted, and gives lists of tests showing that it is quite possible to get pump efficiencies with air lifts of between 60 and 70 per cent. Paper read before British Assn.

PUMPS, CENTRIFUGAL

Flood-Proof Pump House. Novel Condenser Pump House. Elec. Ry. Jl., vol. 58, no. 11, Sept. 10, 1921, pp. 387–391, 9 figs. American Railways power plant at Kenova, W. Va., recently enlarged in capacity, now derives circulating water from new electrically driven centrifugal pumps, housed in a structure which is designed to be floodproof.

R

RAILS

Fissures. Causes of Fissures in Street-Railway Rails (Ursachen der Riffelbildung auf Strassenbahnschienen). P. Oberhoffer. Stahl u. Eisen, vol. 41, no. 33, Aug. 18, 1921, pp. 1137–1141, 14 figs. on supp. plate. Discusses results of tests (shown in tables) carried out on different makes of rails of the Berlin street railway, from which it is concluded that the character of section has a greater influence than quality of material used.

Grooved, Wear of. The Alternating Contact Action Between Car-Wheel Flanges and Grooved Rails on Curves (Die Wechselwirkung zwischen den Berührungskreisen des Räderpaares und des Bogengleises beim Rillenschienenoberbau). F. Hartmann. Verkehrstechnik, vol. 38, no. 19, July 5, 1921, pp. 294–295, 13 figs. Shows that where both flanges are in contact with groove sides, the layout is such that the wear and tear is only half as great as usual.

RAILWAY ELECTRIFICATION

Austria. Electrification of the Austrian Federal Railway (Einführung der elektrischen Zugförderung auf den österreichischen Bundesbahnen). C. Wlach. Elektrotechnische Zeit., vol. 42, no. 20, May 19, 1921, pp. 505–511, 8 figs. Abstract of officially accepted electrification program of Austrian Republic. It is expected to finish four main branches before end of 1925. Description of Austrian main roads which are to be electrified, together with description and sketches of four types of locomotives, all of which are 15,000-volt, 16⅔-cycle a.c. machines.

France. French Railways Electrification—V and VI. Elec. Ry. & Tramway Jl., vol. 44, nos. 1072 and 1077, April 8 and May 13, 1921, pp. 164–165. April 8: Classification of locomotives according to axle arrangement. May 13: Three-phase system as applied to Simplon line, single-phase system as applied to Swiss Railways, and continuous current at high tension.

Holland. Railways Electrification in Holland. Elec. Ry. & Tramway Jl., vol. 45, no. 1095, Sept. 9, 1921, pp. 171–173. Concludes that electrification must be on the direct-current system and a 1500-volt working tension. Report of special commission.

Italy. Electrification Progress on Italian Railways. Giovanni B. Santi. Ry. Age, vol. 71, no. 10, Sept. 3, 1921, pp. 439–442, 6 figs. A number of hydroelectric plants are under construction, as fuel is expensive and hard to obtain.

Switzerland. Electrification Program of the Swiss Federal Railroads (Programme d'électrification des chemins de fer Fédéraux et consequences financières du remplacement de la traction a vapeur par la traction électrique). Bulletin Technique de la Suisse Romande, vol. 47, no. 18, Sept. 3, 1921, pp. 208–211, 5 figs. Compares cost of traction of trains at various prices of coal. (Concluded.)

The Electrification of the Swiss Federal Railways—I and II. Engineer, vol. 132, nos. 3431 and 3432, Sept. 30 and Oct. 7, 1921, p. 335 and 376–377, 1 fig. Abstract of paper by L. Thorman dealing with technical side of electric traction for main lines in so far as it affects electrification of Swiss Federal Railway. Points out successful use of 15,000-volt single-phase current in Switzerland.

RAILWAY OPERATION

Cost of Stopping Trains. The Cost of Stopping a Train, Edwin Winfield. Can. Ry. & Mar. Wld., no. 282, Sept. 1921, pp. 475–476, 1 fig. Discusses train resistance and analyzes cost of stopping.

Freight Traffic, Unit Cost Data for. Unit Cost Data For Freight Traffic. Ry. Gaz., vol. 35, no. 13, Sept. 23, 1921, pp. 458 and 462. Discusses simple method of recording work of freight and mixed trains in order to get ton-mile costs quickly.

Train Control. Train Control Problems Discussed in England. Ry. Signal Engr., vol. 14, no. 9, Sept. 1921, pp. 336–342. Problems of Automatic Train Control by W. J. Thorrowgood; Automatic Train Control by J. Beaumont; Elimination of Frost Trouble by E. W. Kolb; Stop or Proceed vs. Stop and Proceed by A. H. Rudd.

RAILWAY SIGNALING

Electric. Maintenance of A. C. Signal Apparatus. L. F. Viellard. Ry. Signal Engr., vol. 14, no. 9, Sept. 1921, pp. 347–350. Describes experience with a.c. signals and interlockers on Long Island R. R.

Principles of Alternating Current Signaling—VI. J. S. Holliday. Ry. Signal Engr., vol. 14, no. 9, Sept. 1921, pp. 350–352, 2 figs. Vector solutions of correct transformer voltage and distribution of energy between signal motor, slot-coil and lamps.

Position-Light Signal. New Design of Position Light Signal. Ry. Age, vol. 71, no. 12, Sept. 17, 1921, pp. 538–539, 3 figs. Discusses new Pennsylvania R. R. signaling system worked day and night by uncolored electric lights.

RAILWAY TIES

Machine for Cutting and Boring. Cross-Cutting, Adzing and Boring Machine for Railway Sleepers. Engineer, vol. 132, no. 3431, Sept. 30, 1921, pp. 353–354, 4 figs. partly on p. 348. Built by Indian State Railways by Thos. Robinson & Son, Ltd., Rochdale.

RAILWAY TRACK

Construction. On the Question of the Construction of the Road Bed and of the Track. E. F. C. Trench. Bul. International Ry. Assn., vol. 3, no. 8, August 1921, pp. 991–1086, 15 figs. Report deals with Great Britain, India, South Africa, Australia and New Zealand. Gives a large appendix containing answers to question from railways. Concludes that present conditions are satisfactory.

Maintenance. On the Question of the Maintenance and the Supervision of the Track. Earl Stimson. Bul. International Ry. Assn., vol. 3, no. 8, August 1921, pp. 977–990. Concludes that high costs are due to causes beyond the control of supervisory organizations; advises most direct contact between maintenance-of-way engineer and division engineer.

RAILWAYS

France. The Great French Railroad Lines in 1920 (Les résultats de l'exploitation des grands réseaux français de chemins de fer en 1920). Revue Générale des Chemins de Fer, vol. 40, no. 9, Sept. 1921, pp. 141–167. Discusses income and expenditure, rolling stock, traffic, fuel, wages, of the Nord, Est, P.L.M., P.O., Midi and Etat lines, giving numerous tables.

REDUCTION GEARS

Machining. Machining Turbine Reduction Gears. Machinery (Lond.), vol. 18, no. 460, July 21, 1921, pp. 481–483, 6 figs. Discusses methods adopted by W. Beardmore & Co. Dalmuir, Scotland.

REFRACTORIES

Physical Characteristics. Physical Characteristics of Specialized Refractories. M. L. Hartmann and W. A. Koehler. Am. Electrochemical Soc., advance paper no. 9, for Meeting, Sept. 29–Oct. 1, 1921, pp. 129–136, 1 fig. Series of tests to determine transverse breaking strength of each of ten refractories, at 20 and 1350 deg. cent. Chrome brick showed most decided drop in modulus of rupture, followed in order by bauxite, magnesia, fireclay and silica.

REFRIGERATING PLANTS

Fulton Market, Chicago. Fulton Market Cold Storage Plant, Chicago. Power, vol. 54, no. 13, Sept. 27, 1921, pp. 470–473, 4 figs. Describes economical synchronous-motor-driven refrigerating plant to have eventually 10,500,000 cu. ft. of storage space and 888 tons of refrigerating capacity. Compressors are two-stage machines with injection of liquid between stages and pipe coil in intermediate drum to precool ammonia liquor on its way to brine coolers.

Pipe for. Pipe for Refrigeration Systems. Southern Engr., vol. 36, no. 1, Sept. 1921, pp. 50–54, 8 figs. Discusses dependability, bursting pressure, threading principle of pipe, etc.

Reconstruction. Reconstruction of Ice and Cold Storage Plant. Ice & Refrigeration, vol. 61, no. 2, August 1921, pp. 91–93, 7 figs. Sherman Ice Co. Sherman, Texas.

Turbo-Compressor. Calculation of Turbo-Compressor Refrigerating Plant (Intorno al calcolo degli impianti frigoriferi a vapore d'acqua azionati da turbo-compressori). Luigi M. Brunelli. L'Industria, vol. 35, no. 15, August 15, 1921, pp. 334–337, 2 figs. Discusses Leblanc turbo-compressors and its application to refrigeration.

ROLLING MILLS

Matching and Doubling Machine. Mechanical Matcher Lowers Cost. Iron Trade Rev., vol. 69, no. 15, Oct. 13, 1921, pp. 948–950, 5 figs. Manual work involved in aligning and doubling hot rolled sheets is performed by motor-driven machine. Device designed by Lawrence C. Steele, Pittsburgh, is said to offer increased production.

Pack Cooling Bed. New Interstate Mill Has Pack Cooling Bed, Gilbert L. Lacher. Iron Age, vol. 108, no. 14, Oct. 6, 1921, pp. 859–864, 7 figs. Prominent features of new rolling mill in Chicago is pack cooling bed, said to be first installation of its kind in industry, and hot runout table, all rollers having individual motor drive, those next to bed being of swiveled cone type. See also article on same subject by George H. Manlove in Iron Trade Rev., vol. 69, no. 14, Oct. 6, 1921, pp. 869–873 and 880, 10 figs.

Plate Mills. A Plate Mill in Norway, Wilh. Krämer. Eng. Progress, vol. 1, no. 7–8, July–August 1920, pp. 267–270, 2 figs. Describes equipment and working processes of A. S. Norsk Valseverk's installation.

Roll Design. The Logic of Roll Design—V, W. H. Melaney. Blast Furnace & Steel Plant, vol. 9, no. 9, Sept. 1921, pp. 543–545, 3 figs. Proportion of wabbler to size of neck for various type mills is considered.

Rotary Piercing Machines. The Rotary Piercing Machine for Steel and Copper Billets. C. E. Davies. Engineering, vol. 112, nos. 2907, 2908, 2910 and 2911, Sept. 16, 23, Oct. 7 and 14, 1921, pp. 397–399, 429–430, 495–496 and 527–528, 25 figs. Writer seeks to outline satisfactory theory for rotary piercer. Description and theory is obtained from translation of article published in Stahl u. Eisen (Sept. 1919), to which a short summary with remarks on design and use of rotary piercer in England are added.

Sheet Mills. The Possibility of Improved Methods of Rolling Sheet Steel, Sumner B. Ely. Mech. Eng., vol. 43, no. 10, Oct. 1921, pp. 670–671. Points out importance of proper heating in sheet-steel rolling and discusses possibility of a continuous sheet mill. Describes a successful Austrian continuous sheet mill.

RUBBER

Aging Tests. Ten Years' Experience With Aging Tests, William C. Geer. India Rubber Wld., vol. 64, no. 10, Sept. 1, 1921, pp. 887–892, 15 figs. Describes test that can be used for predicting probable effect of natural aging upon vulcanized rubber. Paper read at International Rubber Conference, Lond.

Substitutes. Rubber Substitutes and the Role They Play in Vulcanisation. D. H. Priestley and H. Skellon. Rubber Age, vol. 2, no. 7, Sept. 1921, pp. 351–352. Discusses unsaturated oils and oxydized oils, dark substitutes and white substitutes.

Vulcanization. Influence of Certain Organic Accelerators on Vulcanization of Rubber. George Stafford Whitby and Osman James Walker. Jl. Industrial & Eng. Chem., vol. 13, no. 9, Sept. 1921, pp. 816–819, 4 figs. Influence of 1 per cent of (a) piperidine piperidyl-dithocarbamate (b) hexamethylenetetramine, and (c) thiocarbanilide on the rate of vulcanization of a 90:10 rubber-surface mix etc. Presented before Am. Chem. Soc.

S

SAFETY ENGINEERING

Education in. Education in Safety Engineering as Given at the Lynn General Electric Engineering and Apprentice School, N. M. DuChemin. Safety Eng., vol. 42, no. 3, Sept. 1921, pp. 106–112. Outline of lessons presented in ten lectures.

SCIENTIFIC MANAGEMENT

See INDUSTRIAL MANAGEMENT

SHAPERS

Production Work, Use in. Production Shaping—I. Machy. (N. Y.), vol. 28, no. 2, Oct. 1921, pp. 89–93, 5 figs. Use of shapers in production work for planing column and table castings for Avey drilling machine.

SPECIFIC HEAT

Apparatus. New Specific Heat Apparatus. Ezer Griffiths. Physical Soc. of Lond., Proc., vol. 33, no. 190, August 15, 1921, pp. 355–361, 3 figs. Describes apparatus for determination of specific heat of cork, charcoal, etc., difficult to deal with by ordinary methods.

Lead. The Behaviour of Substances Near The Absolute Zero, William R. Fielding. Chemical News, vol. 123, no. 3201, August 19, 1921, pp. 97–99, 1 fig. Discusses specific heats of lead and gives tables for lead, water and copper.

STANDARDIZATION

German N.D.I. Report. Report of the German Industry Committee on Standards (Mitteilungen des Normenausschusses der Deutschen Industrie). Betrieb, vol. 3, no. 21, July 25, 1921, pp. 319–330, 14 figs. Accepted standards: Blank castel nuts, standard screw heads and points. Proposals of Board of Directors for cotter and taper-pin nut locking devices; sizes for technical photographic prints; proposed standards for steel window sash; concrete sewer pipes.

Report of the German Industry Committee on Standards (Mitteilungen des Normenausschusses der Deutschen Industrie). Betrieb, vol. 3, no. 22, Aug. 13, 1921, pp. 339–348, 16 figs. Proposals of Board of Directors for relative temperature of measuring tools and workpieces; drive and sunk keys, flat keys, saddle keys, fitted and sliding feather keys, gibhead keys, gibhead flat and saddle keys. Proposed standards for belt-pulley diameters; speeds for transmission gears; graphic representation by means of curves.

Report of the German Industry Committee on Standards (Mitteilungen des Normenausschusses der Deutschen Industrie). Betrieb, vol. 3, no. 23, Aug. 27, 1921, pp. 355–360, 7 figs. Proposals of

ENGINEERING INDEX (Continued)

Board of Directors for pressure stages for pipe lines; wires and cables for high-voltage overhead lines. Proposed standards for drawings.

STEAM

Flow Measurement. Steam Flow Measurements from a Boiler, C. T. Mitchell. Power, vol. 54, no. 9, Aug. 30, 1921, p. 318. Points out importance of constant pressure as regards accuracy of steam-flow records, and develops simple formula for calculating amount of steam given off by boiler for given pressure drop, independently of fuel consumption.

High-Pressure. High Pressure Steam in Small Power Plants—III, Charles L. Hubbard. Sanitary & Heating Eng., vol. 96, no. 7, Sept. 23, 1921, pp. 199–201, 9 figs. Disclosing functions and principles of steam specialties used in conjunction with power plants, and explaining their mechanical operations (To be continued.)

Specific Heat. The Various Determinations of the Specific Heat of Steam and Their Technical Significance, H. Schmolke. Mech. Eng., vol. 43, no. 10, Oct. 1921, pp. 675–677. Account of experiments carried out over pressure range of 2 to 8 atmos. and with temperatures ranging from around saturation to 350 deg. cent., and other investigations. Translated from Zeit. für Dampfkessel u. Maschinenbetrieb, vol. 44, nos. 1 and 2, Jan. 7 and 14, 1921.

STEAM ENGINES

Throttle Valves. Throttle Valves for Steam Engines, W. H. Wakeman. Power, vol. 54, no. 10, Sept. 6, 1921, pp. 372–373, 7 figs. Various types.

Uniflow. Straight-Flow High-Lift Poppet-Valve Steam Engine, J. Stumpf. Mech. Eng., vol. 43, no. 8, Aug. 1921, pp. 541–542, 6 figs. Describes engine in which it is claimed, losses due to cylinder condensation, clearance space, throttling, friction, leakage, heat radiation, heat conduction and imperfect expansion are reduced. Its most characteristic element is said to be the very small high-lift nozzle-disk valve employed therein. Translated from Zeit. des Vereines deutscher Ingenieure, vol. 65, no. 19, May 7, 1921.

200 Hp. Uniflow Steam Engine. Engineer, vol. 132, no. 3426, Aug. 26, 1921, pp. 222–224, 5 figs. Describes engine constructed by Galloways, Ltd., Manchester, England, most novel features of which are said to be shockless high-speed valve gear and a compression release device designed by Henry Piling.

STEAM GENERATION

Waste-Heat Utilization. Waste Heat Utilization For Steam Generation, G. R. McDermott. Assn. Iron & Steel Elec. Engrs., vol. 3, no. 9, Sept. 1921, pp. 293–319, 7 figs. Gives particulars of tests with waste heat boilers and discusses sources of waste gases, including those from large gas engines.

STEAM GENERATORS

Electric. An Electric Steam-Generator For Low Voltage, F. A. Lidbury and F. A. Stamps. Am. Electrochemical Soc., advance copy, no. 4, pp. 77–86, 2 figs. Describes an inexpensive form of apparatus for the generation of steam by means of alternating current of voltages from 100 to 500. (Abstract.)

STEAM PIPES

Resistance Reduction. Savings Effected by Reducing the Resistance in Steam Pipe Lines (Ersparnisse durch Verminderung der Widerstände in Dampfleitungen), O. Denecke. Zeit. für Dampfkessel u. Maschinenbetrieb, vol. 44, no. 26, July 1, 1921, pp. 201–204, 2 figs. Total pressure reduction through friction and various resistances. Determination of diameter of pipe with given pressure reduction for any given resistances. Curve is given with which it is possible to read pipe diameter for any steam volume, pipe length, variation of pressure and of the various resistances.

STEAM POWER PLANTS

Condensation in Turbine Room. Condensation in Turbine Rooms of Steam Power Stations, L. J. Towne. Stone & Webster Jl., vol. 29, no. 3, Sept. 1921, pp. 119–225. Condensation on walls and ceilings especially inconvenient during winter months. How condensation occurs and fundamental principles which will prevent or minimize this trouble.

Buick Motor Co. The New Buick Plant. Power Plant Eng., vol. 25, no. 17, Sept. 1, 1921, pp. 835–845, 14 figs. Describes coal-handling equipment, engine and boiler room, wood-burning equipment and electric equipment of Buick Motor Co., a subsidiary of General Motors Corp.

Hydraulic-Relay. Requirements in the Design of Steam Power Stations for Hydraulic Relay, E. B. Powell. Mech. Eng., vol. 43, no. 10, Oct. 1921, pp. 650–652 and 674, 6 figs. Flow or head deficiency type of relay; effect of growth of load, seasonal variation of flow and pondage; relay stations for minimum flow development and for higher-load-factor conditions. Emergency reserve type of relay.

Oil-Burning. Efficient Operation of Oil-Burning Steam Plants, C. H. Delany. Mech. Eng., vol. 43, no. 9, Sept. 1921, pp. 603–605, 4 figs. Discussion of plant characteristic diagram, with particulars regarding its use in establishment of standard of performance and in increasing plant efficiency.

STEAM TRAPS

Types. Steam Traps—Types, Principles of Operation, Selection, Installation, Troubles, Remedies, L. A. H. Merrihew. Power, vol. 54, no. 10, Sept. 6, 1921, pp. 378–381, 4 figs. Savings by proper use of traps; advantages and disadvantages of each type.

STEAM TURBINES

Bleeder. Estimating Steam Consumption of Bleeder Turbines, Joseph Gershberg. Power, vol. 54, no. 15, Oct. 11, 1921, pp. 556–557, 1 fig. Explains convenient method of estimating steam consumption at given load and with given amount of steam being bled.

Curtis Impulse. Efficiency Tests of a 30,000 kw. Turbine, Herbert B. Reynolds. Power House, vol. 14, no. 16, August 20, 1921, pp. 21–25 and 27, 8 figs. Turbines are of Curtis impulse type having twenty pressure stages. Gives tables of turbine, condenser and dry-vacuum-pump tests.

Design. Recent Developments in Steam Turbine Design, C. J. Everett. Trans. S. African Inst. Elec. Engrs., vol. 12, part 7, July 1921, pp. 131–142, 10 figs. Discusses impulse type; Curtis impulse; reaction type; radial-flow type; steam, shaft, and disk packings; blading; etc.

Developments. Some Recent Developments in Large Steam Turbine Practice, K. Baumann. Jl. Instn. Elec. Engrs., vol. 59, no. 302, June 1921, pp. 565–623 and (discussion) 623–663, 49 figs. Part I—Discusses general trend of development, reaction turbines, impulse turbines, turbines for special purposes. Part II—Discusses reliability, working conditions, thermodynamic efficiency, overall dimensions, weights and costs in connection with turbine design. Part III—Economic rating of a given turbine frame. Part IV—Maximum output of turbines at a given speed. Part V—Governing of steam turbines. Part VI—Steam consumption guarantees and test results of large turbines. Part VII—Operation experience with large turbines.

Efficiency Tests. Efficiency Tests of a 30,000-Kw. Steam Turbine, Herbert B. Reynolds. Mech. Eng., vol. 43, no. 7, July 1921, pp. 450–454 and 460, 8 figs. Account and results of tests carried out during 1920 on General Electric turbines at 59th St. power station of Interborough Rapid Transit Co., New York City. These turbines are of straight Curtis impulse type, having 20 pressure stages, each pressure stage consisting of one velocity stage; speed is 1500 r.p.m.

Foundations. Steam Turbine Foundations of Reinforced Concrete (Dampfturbinen-Fundamente aus Eisenbeton), Paul Müller. Bauingenieur, vol. 2, nos. 16 and 17, Aug. 31 and Sept. 15, 1921, pp. 436–439 and 474–478, 14 figs. Writer seeks to determine influence of dynamic action of turbo-compressors and generators on their foundations, and recommends basic form for such foundations which, with minimum use of material, is qualified to withstand all such unfavorable influences.

Heat Balance. Heat Balance with House Turbine-Power, vol. 54, no. 10, Sept. 6, 1921, pp. 382–383, 2 figs. Layout of system for obtaining heat balance with house turbine.

High-Capacity. Steam Turbines for Maximum Loads, A. Loschge. Mech. Eng., vol. 43, no. 9, Sept. 1921, pp. 607–608, 2 figs. Discusses magnitudes which determine value of maximum output of turbine, technical difficulties which have to be overcome in order to make a higher output possible, and ways and means adopted by various concerns to overcome these difficulties. Translated from Zeit. des Vereines deutscher Ingenieure, vol. 65, no. 28, July 9, 1921.

Safe Operation. Safety Precautions in the Operation of Large Turbines. Power, vol. 54, no. 10, Sept. 6, 1921, pp. 354–357, 5 figs. Practical pointers on avoiding turbine injury due to spindle deflection, blade rub, dummy rub and other causes, together with rules for starting and stopping large turbines.

[See also MARINE STEAM TURBINES.]

STEEL

Bars, Specification for. British Standard Specification for Steel Bars for the Production of Machined Parts. British Eng. Standards Assn., no. 32, May 1921, 13 pp., 4 figs. Specification of bars for production of machined parts suitable for automatic, semi-automatic and turret lathes. Tables of round, square and hexagon bars; Appendix giving forms of British standard tensile-test pieces.

Coalescence in. Contributions to the Study of Coalescence in Steels and Its Commercial Results, Albert Portevin and Victor Bernard. Iron & Steel Inst. advance proof for meeting Sept. 5–6, 1921, no. 6, 35 figs., 10 figs. Experiments are said to afford abundant evidence of influence of initial structural state on solution of cementite during heating, on its precipitation on cooling, and therefore on general result of quenching.

Corrosion. Rust Prevention by Slushing, Haakon Styri. Am. Electrochemical Soc. advance paper no. 8, for Meeting, Sept. 29–Oct. 1, 1921, pp. 113–128. It is shown that a prerequisite for protection against rust by greases is a thorough cleaning of steel parts by an aqueous solution, preferably by oil emulsion which leaves a thin oil film for short time protection.

Damascene. Damascene Steel, N. T. Belaiew. Iron & Steel Inst. advance proof for meeting Sept. 5–6, 1921, no. 1, 4 pp., 1 fig.; also Engineering, vol. 112, no. 2906, Sept. 9, p. 395, 1 fig. In author's opinion a marked analogy exists in structure and in some of properties of high-speed and damascene steels, and a comparative study of both is presented.

Elasticity. On the Temperature Coefficient of the Modulus of Longitudinal Elasticity of Steel, H. M. Dadourian. Lond., Edinburgh, and Dublin, Phil. Mag. & Jl. Sci., vol. 42, no. 249, Sept. 1921, pp. 442–448. Reviews work done on the subject and describes additional experiments.

Fatigue Resistance. Fatigue Resistance of Steel under Repeated Combined Stresses, Akimasa Ono. Jl. Soc. Mech. Engrs. & Soc. Nav. Architects, Sept. 1921. (In Japanese.)

Fracture. Woody Fracture in Steel (Ein Beitrag zur Frage des Holzfaserbruches im Stahl), J. Hanny. Stahl u. Eisen, vol. 41, no. 37, Sept. 15, 1921, pp. 1298–1300. Shows how in production of gun steel, it was possible to prevent formation of woody fracture, through measures based on assumption that inclusions of carbon-monoxide bubbles originating in oxides are the cause of such formations.

Mechanical Properties. An Experimental Investigation of the Mechanical Properties of Steels at High Temperatures, E. L. Dupuy. Engineering, vol. 112, nos. 2906 and 2907, Sept. 9 and 16, 1921, pp. 391–394 and 427–428, 33 figs.; also Iron & Steel Inst. advance proof, Sept. 1921, no. 2, 22 pp., 33 figs. Determination of mechanical properties of steels in respect of their carbon percentages, at all temperatures between normal and incipient fusion. Experiments were carried out on both cast and rolled material.

Physics in. New Discussion on the Physics of Steel, Wm. R. Webster. Blast Furnace & Steel Plant, vol. 9, no. 9, Sept. 1921, pp. 555–563. Application in rolling of effects of carbon, phosphorus and manganese on mechanical properties of steel.

Special. On the Question of Special Steels, M. Sand. Bul. International Ry. Assn., vol. 3, no. 8, August 1921, pp. 1103–1107. Discusses trials with cast manganese steel and Edelstahl cast-steel crossings, also Sandberg process applied to rails of basic open-hearth high-silicon steel.

Tensile Tests. Elongation and Gauge Length in Tensile Tests, J. H. G. Monypenny. Engineer, vol. 132, no. 3426, Aug. 26, 1921, pp. 220–221, 2 figs. Results of series of comparative tests on a large series of steels to see if it were possible to fix some approximate relationship for commercial use between values obtained on British standard test piece on one hand and French and German types on the other.

Testing. Test for Shock Strength of Hardened Steel, C. E. Margerum. Forging & Heat Treating, vol. 7, no. 9, Sept. 1921, pp. 488–490, 3 figs. Describes apparatus to determine ability to resist impact and gives curves of various impact strength tests. Paper presented before Am. Soc. for Testing Materials.

The Influence of the Width of the Specimen Upon the Results of Tensile Tests of Mild Steel and Rolled Copper, T. Hudson Beare and William Gordon. Engineering, vol. 112, no. 2906, Sept. 9, 1921, pp. 389–391, 6 figs. Results of experiments show that, as final thickness is shown to be practically constant for all widths of specimen, decline in percentage of reduction of area is due to gradual diminution in proportional reduction of width. Paper read before British Assn. in Edinburgh.

The Influence of the Width of the Specimen Upon the Results of Tensile Tests of Mild Steel and Rolled Copper, T. Hudson Beare and William Gordon. Metal Industry (Lond.), vol. 19, no. 12, Sept. 16, 1921, pp. 209–212, 6 figs. Details of experiments carried out. Paper read before British Assn.

Worked, Structure of. Structure of Worked Steel as Shown by Etched Sections (Kraftwirkungsfiguren in Flusseisen, dargestellt durch ein neues Aetzverfahren), Ad. Fry. Stahl u. Eisen, vol. 41, no. 32, Aug. 11, 1921, pp. 1093–1097, 19 figs. Describes new etching process which, under certain conditions, reveals peculiar, heretofore unobserved figures; and the brittleness of iron at blue heat is traced to these phenomena.

[See also ALLOY STEEL; CHROME-NICKEL STEEL; MANGANESE STEEL; MOLYBDENUM STEEL; STEEL, HIGH-SPEED.]

STEEL, HEAT TREATMENT OF

Annealing. A Metallographic Characteristic for the Determination of the Pre-Heating of Soft Low-Carbon Steel (Ueber ein metallographisches Kennzeichen für die Ermittlung der vorangegangenen Glühbehandlung von weichem Flusseisen), P. Oberhoffer. Stahl u. Eisen, vol. 41, no. 35, Sept. 1, 1921, pp. 1215–1217, 8 figs. Describes characteristic in structure which makes it possible to determine whether annealing has taken place between Ac_1 and Ac_3.

Cast Steel. The Thermal Treatment of Cast Steel, Alvin N. Conarroe. Trans. Am. Soc. for Steel Treating, vol. 1, no. 12, Sept. 1921, pp. 746–757, 35 figs. Concludes that steel castings can be refined by heat treatment to possess physical characteristics comparable to forgings; also considers inclusions, segregation, shrinkage, etc.

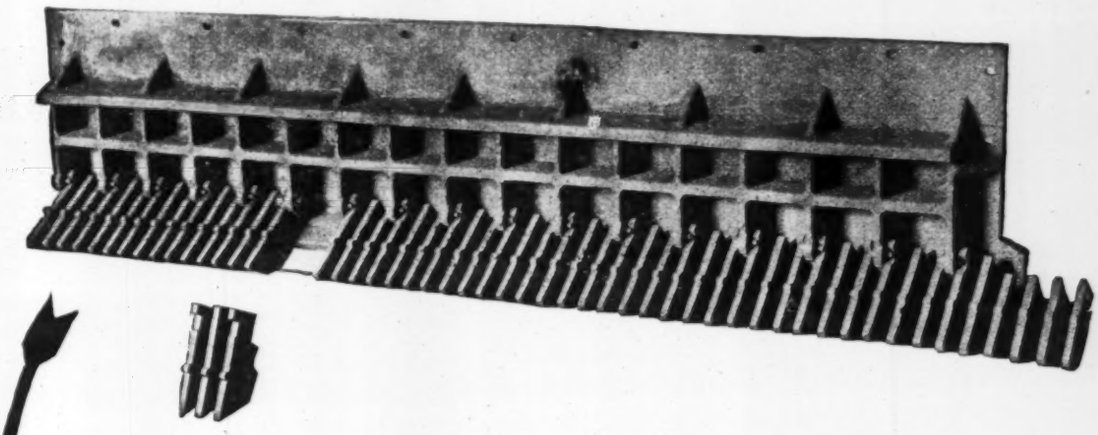
Characteristic Curves. The "Characteristic Curves" of the Heat Treatment of Steels, Albert M. Portevin and Pierre Chevenard. Iron & Steel Inst., advance proof for meeting Sept. 5–6, 1921, no. 7, 19 pp., 11 figs. So-called characteristic curves combine, within a single diagram, fundamental data of every possible heat treatment, and also afford a means of defining accurately the annealed and hardened states of the particular steel.

Drop Forgings. Effect of Heat-Treatment on Steel Castings and Drop Forgings, A. A. Blue. Am. Mach., vol. 55, no. 11, Sept. 15, 1921, pp. 413–418, 26 figs. Results of tests at different stages in heat treatment. Chemical analyses and their results.

Hardened Carbon Steel. Thermal and Physical Changes Accompanying the Heating of Hardened Carbon Steels, Howard Scott and H. Gretchen Movius. Trans. Am. Soc. for Steel Treating, vol. 1, no. 12, Sept. 1921, pp. 758–774, 12 figs. Discusses in detail the transformations in steel below the A_1 change.

Overheating, Effect of. Effect of Overheating High Carbon Steel, Lancelot W. Wild. Blast Furnace & Steel Plant, vol. 9, no. 9, Sept. 1921, pp. 541–542. Heating to the completion of the magnetic change before quenching gives strongest, toughest, best wearing and best cutting steel.

Quenching. Cooling Oil for Quenching Tanks, S. E. Derby. Iron Trade Rev., vol. 69, no. 11, Sept. 15, 1921, pp. 674–676, 5 figs. Proper speed of



Murphy Furnace Construction Arch Plate

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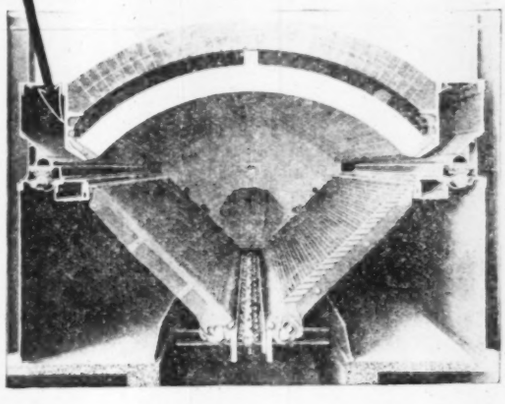

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ENGINEERING INDEX (Continued)

cooling steel is said to be determining factor in attaining degree of hardness; after determining best temperature of medium, it should be maintained by suitable cooling system.

Steel Castings. Heat Treating Improves Castings, Martin M. Rock. Iron Trade Rev., vol. 69, no. 11, Sept. 15, 1921, pp. 677–679. Tensile tests of unannealed, annealed, air-cooled and water-quenched steel castings do not disclose marked difference in strength, but impact tests show water-quenched product excels other three.

Stresses. Stresses Resulting from Heat Treatment (Das Entstehen von Spannungen bei der Wärmebehandlung), W. Tafel. Stahl u. Eisen, vol. 41, no. 38, Sept. 22, 1921, pp. 1321–1328, 13 figs. It is shown that every heat treatment of a spherical, prismatic or cylindrical body changes its state of stress, based on which the principal deformations in connection with hardening are derived and conclusions arrived at relative to annealing and hardening of steel.

Tempering. Changes Taking Place in Steels During Tempering (Sur la nature des transformations qui se produisent pendant la trempe des aciers), M. P. Dejean. Revue de Métallurgie, vol. 18, no. 7, July 1921, pp. 419–427, 7 figs. Discusses critical points in cooling of nickel steel, carbon steel, manganese steel, etc.

On the Tempering Phenomena of Steels (Remarque et observations concernant les phénomènes de trempe des aciers), Portevin and P. Chevenard. Revue de Metallurgie, vol. 18, no. 7, July 1921, pp. 428–444, 16 figs. Discusses cooling and elongation curves, cementite formation, etc. in ferro-nickel system.

Volume Changes. Volume Changes in the Heat Treatment of Steel, Leslie Aitchison. Trans. Am. Soc. for Steel Treating, vol. 1, no. 12, Sept. 1921, pp. 734–737, 2 figs. Gives curves showing alterations in volume during heating and cooling.

STEEL, HIGH-SPEED

Heat Treatment. Heat Treatment of High Speed Steel, J. L. Thorne. Trans. Am. Soc. for Steel Treating, vol. 1, no. 12, Sept. 1921, pp. 727–732 and (discussion) 732–733. Discusses composition, influence of principal elements, and various stages of heat treating.

Metallurgy of. The Metallurgy of High Speed Steel, D. M. Giltinan. Trans. Am. Soc. for Steel Treating, vol. 1, no. 12, Sept. 1921, pp. 716–726, 10 figs. Discusses present requirements of high-speed steels to meet demand for increased production without increased cost; theories of self-hardening.

STEEL WORKS

Anti-Friction Bearings. Anti-Friction Bearings in the Steel Mill, A. M. MacCutcheon. Assn. Iron & Steel Elec. Engrs., vol. 3, no. 9, Sept. 1921, pp. 321–350, 16 figs. Discusses advantages and disadvantages of anti-friction and oil ring type of bearings, development of ball and roller bearings, mounting of anti-friction bearings and experiences in various mills.

Fuel Requirements. Fuel Requirements of Steel Mills, F. E. Leahy. Assn. Iron & Steel Elec. Engrs., vol. 3, no. 9, Sept. 1921, pp. 427–435. Discusses application of solid, gaseous and liquid fuels, also pulverized coal.

Railway Electrification. Electrification of the Steel Plant Railroad, R. B. Gerhardt. Assn. Iron & Steel Elec. Engrs., vol. 3, no. 9, Sept. 1921, pp. 277–291. Concludes that electric motor will displace steam engine just as happened in rolling mills.

STOKERS

Capacity and Limitations. Capacity and Efficiency Limitations of Stokers Using Mid-West Coals, John E. Wilson. Mech. Eng., vol. 43, no. 8, Aug. 1921, pp. 536–537 and 561. In case of natural-draft chain-grate stokers, greatest losses are said to be those due to dry chimney gases and carbon in ash. Capacity is governed principally by available draft and ratio of total boiler heating surface to grate area. Notes on use of underfeed and overfeed forced-draft stokers in Mid-West.

Limitations. Limitations of Mechanical Stokers Utilizing Mid-West Coals, Edward H. Tenney. Mech. Eng., vol. 43, no. 8, Aug. 1921, pp. 535–536. Points out that Mid-West coals are characterized by higher moisture, volatile and ash contents as compared with Eastern coals. Discusses limitations imposed by air supply and by design of furnace; and effect of these various limitations on stoker operation. (Abstract.)

Low-Grade Fuel. Stoking Inferior Fuels, A. Wirth. Eng. Progress, vol. 2, no. 8, August 1921, pp. 185–189, 27 figs. Discusses grates, traveling stokers, removal of slag and ashes.

Traveling Grate Regulators. Speed Regulators for Traveling Grates (Geschwindigkeitsregler für Wanderroste), H. Generlich. Zeit. des Vereines deutscher Ingenieure, vol. 65, no. 36, Sept. 3, 1921, pp. 943–944, 5 figs. Describes device for automatic regulation of speed of grate.

SUPERHEATED STEAM

Use in Sugar Factories. The Employment of Superheated Steam in Sugar Factories, E. de Bernard. La. Planter & Sugar Mfr., vol. 47, no. 13, Sept. 24, 1921, p. 202, 1 fig. Points out that in order to employ superheated steam, it is necessary to have separate boilers for supplying machine developing motive power and for supplying steam to evaporators, as then different pressures in both cases may be developed.

SUPERHEATERS

Design and Calculation. Steam Superheaters: Their Design, Construction, Application and Use, H. B. Oatley. Mech. Eng., vol. 43, no. 10, Oct. 1921, pp. 663–669, 15 figs. Fundamentals of design and materials used. Characteristics and details of locomotive, marine and stationary superheaters. Operating conditions where reciprocating or rotating prime movers used superheated steam. Results obtained by using superheated steam.

T

TEMPERATURE MEASUREMENT

Radiation of Energy. The Measurement of Temperature—XIV, P. Field Foster. Mech. World, vol. 70, no. 1811, Sept. 16, 1921, pp. 225–226, 3 figs. Discusses radiation, or transmission, of energy without the aid of intervening matter. (To be continued.)

TERMINALS, LOCOMOTIVE

Oklahoma City, M., K. & T. Ry. Oklahoma Engine Terminal and Line Revision; M., K. & T. Ry. Eng. News-Rec., vol. 87, no. 11, Sept. 15, 1921, pp. 440–443, 10 figs. Extensive improvements cover terminal and freight facilities and new entrance to city. Novel turntable. Coal, ash and water-softening plants.

TEXTILE MILLS

Air Conditioning. Air Conditioning in Textile Mill (in Japanese), Masanosuke Yanagimachi. Jl. Soc. Mech. Engrs., Tokyo, Japan, vol. 24, no. 69, June 1921, pp. 11–23, 3 figs.

TIDAL POWER

Utilization. The Utilisation of Tidal Power, with Special Reference to the Severn Estuary, F. C. Lea. Engineering, vol. 112, no. 2907, Sept. 16, 1921, pp. 424–426, 8 figs. Writer summarizes preliminary work and investigations necessary before decisions are come to, relative to use of tidal estuaries for power purposes. Paper read before British Assn.

Transmission of Electrical Energy and Tidal Power, T. F. Wall. Engineer, vol. 132, no. 3431, Sept. 30, 1921, p. 345. Brief preliminary outline of system obviating difficulty of varying speeds of turbines, and permitting use of a.c. generators driven directly from turbines. (Abstract.)

TIME STUDY

Foundries. Time Studies in the Foundry, A. G. Peter. Indus. Management, vol. 62, no. 4, Oct. 1921, pp. 244–250, 3 figs. Describes method of graphic analysis of molding work, and its successful operation at Chain Belt Co., Milwaukee, Wis.

Stop-Watches. More Jobs for the Factory Stop-Watch—I. Factory, vol. 27, no. 4, Oct. 1921, pp. 473–475, 1 fig. Describes development of stop-watches and different types which are available for different industrial uses.

TOOL MAKING

Analysis of Production. Analysing Tool Production Problems. Eng. & Indus. Management, vol. 6, no. 14, Oct. 6, 1921, pp. 370–373, 9 figs. Describes method of analysis and gives results of alternative methods of machining and set-up.

TRACTORS

Cletrac. Smaller Tractor Added to Cleveland Line, J. Edward Schipper. Automotive Industries, vol. 45, no. 10, Sept. 8, 1921, pp. 454–457, 6 figs. Describes the "Cletrac" built by Cleveland Tractor Co.; weighs 1820 lbs. and can plow 6 to 8 acres a day; can perform other farm tasks.

TRADE UNIONS

Influence on Production. Some Thoughts on Modern Trade Unionism—II, Edward Brown. Eng. & Indus. Management, vol. 6, no. 9, Sept. 1, 1921, pp. 237–239. Its influence on production.

Modern. Some Thoughts on Modern Trade Unionism—IV, V and VI, Edward Brown. Eng. & Indus. Management, vol. 6, nos. 11, 12 and 13, Sept. 15, 22 and 29, 1921, pp. 296–298, 320–322 and 356–358. Sept. 15: Discusses share of trades unions in control of industry. Sept. 22: Relation to individual worker. Sept. 29: Is trade unionism the means or the end?

TUBING

Steel. Investigation of the Effect of the Ratio of Diameter to Gage Thickness Upon the Torsional Strength of Steel Tubing. Air Service Information Circular, vol. 3, no. 263, July 20, 1921, 11 pp., 6 figs. Research of investigation showing that modulus of rupture of thin wall steel tubing varies with relation to diam./thickness.

V

VENTILATION

Air Filtration in Buildings. A Study of the Infiltration of Air in Buildings, F. Paul. Jl. Am. Soc. Heating & Ventilating Engrs., vol. 27, no. 6, Sept. 1921, pp. 671–676, 5 figs. Supplementary to report by O. W. Armspach in same journal (Jan. 1921), explaining fundamental principles of experiments being conducted, methods followed, etc. Present report contains explanation of several changes and refinements introduced and report of 25 tests conducted in seven different rooms in five different buildings.

VISCOSIMETERS

Atreco Air-Bubble. Air Bubble Viscosimeter, Victor R. Abrams, Joseph T. Kavanagh and Charles H. Osmond. Chem. & Met. Eng., vol. 25, no. 14, Oct. 5, 1921, pp. 665–666, 1 fig. Describes "Atreco" viscosimeter constructed on the principle that the rate of gravitational upward movement of an air bubble in a liquid is a function of the viscosity of the latter.

W

WAGES

Piecework Payment System. Piecework and Production, H. Varley. Eng. & Indus. Management, vol. 6, no. 11, Sept. 15, 1921, pp. 291–292. Advantages and disadvantages of piecework payment system. Elements of a successful system of payment.

Premium System. The 100 Per Cent Time Premium Plan, L. V. Estes. Management Eng., vol. 1, no. 4, Oct. 1921, pp. 231–234. How it is applied to payment of wages for both individual and gang effort.

System. The Wages System and Possible Developments. Eng. & Indus. Management, vol. 6, no. 13, Sept. 29, 1921, pp. 346–349. Abstract of paper entitled Principals of Wages Determination by W. L. Hichens, and one entitled Grading of Labour, by A. W. Kirkaldy, read before British Assn.

WASTE ELIMINATION

Industrial. Federated American Engineering Societies Reports on Elimination of Waste in Industry. Ry. & Locomotive Eng., vol. 34, no. 9, Sept. 1921, pp. 245–246. Review of report.

Report on Elimination of Waste in Industry. Mech. Eng., vol. 43, no. 9, Sept. 1921, pp. 579–583. Committee authorized by Am. Eng. Council and appointed by Herbert Hoover points out wastes and recommends steps for elimination.

Save and Have, Harold D. Winney. Indus. Management, vol. 62, no. 4, Oct. 1921, pp. 216–220, 3 figs. How war on waste at Gen. Elec. Co.'s largest plant (Schenectady) is conducted.

WASTE HEAT

Recovery and Application. The Utilization of Exhaust and Intermediate Pressure Steam, H. Dubbel. Eng. Progress, vol. 1, no. 5, May 1920, pp. 173–179, 17 figs. Discusses waste-heat recovery and its various applications.

WATER HAMMER

Elimination. Water Hammer in Pipes and Its Elimination [Stosserscheinungen in hydraulischen Systemen (Rohrleitungen) und ihre Bekämpfung], H. Schneider. Betrieb, vol. 3, no. 23, Aug. 27, 1921, pp. 738–743, 7 figs. Simple ratios for impact pressure increases in hydraulic systems are derived, and means for combating them described.

WATER POWER

Development. Notes on Water-Power Development, A. H. Gibson. Engineering, vol. 112, no. 2907, Sept. 16, 1921, pp. 420–422; also Engineer, vol. 132, nos. 3428 and 3429, Sept. 9 and 16, 1921, pp. 273–274 and 301–302. Notes on world's available water power; power available in Great Britain and British Empire; uses of hydroelectric energy; conservation; scope for future development and modern tendencies in hydroelectric development. Among questions still requiring investigation are mentioned: turbines, dams, run-off data, tidal power, etc.

Main and Danube Rivers. Hydroelectric Power Resources Along the Main-Danube Waterway in Bavaria (Die Grosswasserkräfte an der Main-Donau-Wasserstrasse in Bayern). Elektrotechnische Zeit., vol. 42, no. 20, May 19, 1921, pp. 511–514, 5 figs. Review of book by J. Hallinger, Munich, giving results of investigation of possibilities of large water powers. Waterway in its present form would yield 100,000 hp., but with some additions and connections with other watersheds, 1,000,000 may be obtained. Sketches of proposed sites are included.

WELDING

Hammer. Welding, Particularly Hammer Welding, Ernest Edgar Thum. Chem. & Met. Eng., vol. 25, no. 12, Sept. 21, 1921, pp. 553–561, 18 figs. Brief discussion of various modern methods of welding, indicating advantages and limitations of each, and field for hammer-welding heavy pressure vessels, operations necessary for hammer-welding steel sheets.

Hyde Process. The Hyde Welding Process. Engineering, vol. 112, no. 2905, Sept. 2, 1921, pp. 338–339, 15 figs. partly on supp. plate. Method of uniting iron and steel which partakes of nature of both welding and brazing; consists of uniting surfaces by means of molten copper, the copper impregnating masses of metal to be joined and uniting them in such a way that they cannot again be separated by heat.

Rail Joints. Welding Rail Joints. Welding Engr., vol. 6, no. 8, August 1921, pp. 23–25, 11 figs. Discussion of work done on street railways by Lincoln process.

Thermit and Electric Rail. The Thermit and the Electric Welding Processes with Special Regard to Welding of Rails (Das Thermit-Schweissverfahren und das elektrische Schweissverfahren unter besonderer Berücksichtigung der Schienenschweissung), H. Lange. Elektrotechnische Zeit., vol. 42, no. 27, July 7, 1921, pp. 722–724, 4 figs. Discussion of most important systems.

[See also AUTOGENOUS WELDING, ELECTRIC WELDING; ELECTRIC WELDING, ARC.]

WIND TUNNELS

Balances for. The Bifilar Windbalance, A. F. Zahm. Jl. Franklin Inst., vol. 192, no. 2, Aug. 1921, pp. 233–237, 3 figs. For delicate measurement of air resistance along stream, in a wind tunnel. Practical usefulness.

In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers

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Volume 43 | January, 1921 | Number 1

A.S.M.E. AFFAIRS

Secretary's Letter—A.S.M.E. Council Notes—Nominating Committee for 1920—Professional Section Notes—Local Sections Celebrate Fortieth Anniversary—Standing Committees' Reports—Personals—Necrology—Employment Bulletin—Candidates for Membership

American Engineering Council

The Secretary's Letter

Dr. John R. Mott, the head of the Y. M. C. A. movement, who has traveled extensively abroad and throughout the United States, both during and since the war, states that Herbert Hoover is the most beloved man in the world.

Mr. Hoover is essentially an engineer. He is loyal to the engineer, and attributes his success in welfare work to the employment of engineering methods.

The engineers of the United States have successfully organized themselves into a representative joint body, the American Engineering Council, with Herbert Hoover at its head. What greater inspiration could we have for good works?

I am unalterably opposed to the formation of any more societies. The American Engineering Council, however, is not another society; it is a joint committee, devoted to our work where as a profession we deal with public affairs.

The outstanding feature of this great joint effort is that it is to be made for the good of others instead of for the promotion of any selfish interests involved in our human relationships.

Too long has it been the attitude of the engineer to think impersonally regarding his obligations to society. That day, however, is passing, and the American Engineering Council, representative of many engineering societies of the United States, is now going to express collectively the individual efforts and thoughts of the engineers. And in order for engineers to be forceful they must think on public matters, and train themselves by serving on committees and holding office, first locally and then nationally.

The American Engineering Council is not a super-body—it is a representative body, where each individual not only maintains but enhances his individuality. In it he is given an opportunity for self-expression, which heretofore has been more or less restrained. The societies of which he is a member begin to express themselves unselfishly; and their individuality is not only scrupulously protected, but in proportion as they render service to the community and nation, will their individuality stand out.

Hail to the American Engineering Council!

A.S.M.E. Council Notes

The November meeting of the Council was held in Washington on the 17th in connection with the organization meeting of the American Engineering Council. There were present: President Fred J. Miller; Vice-Presidents Fred R. Low, R. H. Fernald, Dexter S. Kimball, John A. Stevens; Managers D. Robert Yarnall, C. L. Newcomb, F. O. Wells; Past-Presidents D. S. Jacobus, C. T. Main; Chairmen of Standing Committees: E. S. Carman, Local Sections; A. M. Greene, Jr., Research; George A. Orrok, Publications; Frank E. Law (vice-chairman) Finance, and John E. Harrington, Constitution and By-Laws; Guests; W. H. Kenerson, Sections Committee, George A. Weschler, L. A. Fischer, A. R. Cheyney, D. A. Gurney, Washington Local Committee, and M. O. Leighton, Engineering Council; Delegates to American Engineering Council: W. B. Gregory, A. M. Greene, Jr., W. A. Hanley, L. C. Nordmeyer, V. M. Palmer, A. L. Rice, P. Wright, R. Sibley, and H. P. Porter; officers-elect for 1921: E. S. Carman, president-elect, L. P. Alford and R. B. Wolf, vice-presidents-elect; Secretary, Calvin W. Rice.

The Secretary reported the death of Vice-President John R. Allen, and a committee was appointed to prepare resolutions.

Finance. Frank E. Law pointed out that the apparent minimum requirements for the new year showed an excess over apparent income of some $19,000. To meet this situation his committee suggested three possible programs, as follows:

(1) A curtailed program, with our present income, for this year.

(2) A normal program with increase of dues to $20 } for the

(3) A desirable program with increase of dues to $25 } future.

After discussion it was voted that appropriations to committees be curtailed by an amount necessary to make expenditures come within the receipts of the Society. Further, that the suggestions of the Finance Committee be referred jointly to the Finance Committee and the Committee on Local Sections, with the request that they study them, and immediately refer the whole question to the chairmen of local sections; with the request that the Local Sections delegates to the Annual Meeting come prepared to discuss the matter and advise the Council.

Local Sections. The petition for a section in the Lehigh Valley, to include Allentown, Bethlehem, Easton, Phillipsburg and vicinity, was accepted.

Professional Sections. The petition signed by Mr. George H. Perkins and members of the Society for the establishment of a Professional Section on Textiles was approved.

The petition signed by Mr. George A. Orrok and members of the Society for the establishment of a Professional Section on Gas Power was approved.

Research. The Chairman of the Sub-Committee on Bearing Metals, Mr. C. H. Bierbaum, was requested to take out a patent on the Microcharacter and then assign it to the Society, manufacturers to be licensed to use the patent without charge.

Bearing Metals. The report of this committee was received and referred to the Annual Meeting.

Boiler Code. Interpretations of the Boiler Code Committee dated October 14 were approved.

The National Board of Boiler and Pressure Vessel Inspectors was authorized to appoint one of the members of their board a member of the Boiler Code Committee.

The State of Minnesota was granted permission to print part of the Boiler Code, which is copyrighted.

Code of Ethics. The report of this committee was received and referred to the Annual meeting.

Standard Tonnage Basis for Refrigeration. The report of this Committee was received and referred to the Annual Meeting.

American Engineering Standards Committee. Joint sponsorship with the National Safety Council on Standardization of a color scheme for piping installations was accepted.

Membership in American Engineering Standards Committee of

(1) Department of the Interior of the United States,

(2) The Gas Group (comprising, at present, the American Gas Association, the Compressed Gas Manufacturers' Association, the International Acetylene Association) to be admitted to membership with three representatives,

(3) American Electric Railway Association,

was approved.

Appointments by the President. H. de B. Parsons and Daniel E. Moran to represent the Society at the Conference on Highways of the National Research Council.

Engineering Foundation. The Council, in recognizing the splendid gifts of Ambrose Swasey, Honorary Member and Past-President, to Engineering Foundation, directed the Secretary to have resolutions framed.

National Screw Thread Commission. Mr. Ralph E. Flanders was nominated to the Secretary of Commerce for appointment on the National Screw Thread Commission, in place of Governor Hartness.

Adjournment. It was voted to adjourn to meet in New York December 7, in connection with the Annual Meeting of the Society

CALVIN W. RICE, *Secretary.*

Regular Nominating Committee for 1921

At the Annual Business Meeting of the Society held in New York on December 8 in connection with the Annual Meeting, the following were elected as the Regular Nominating Committee for 1921 on the recommendation of the Local Sections delegates which met the day before and made nominations for the purpose:

GROUP	SECTIONS	COMMITTEE	ALTERNATES
1	Boston, Worcester Connecticut Philadelphia Baltimore Eastern N. Y.	Elmer Smith, Boston, Mass.	J. A. Hall, Providence, R. I.
2	New York (Metropolitan Sec.).	G. K. Parsons, New York, N. Y.	W. Herman Greul, New York, N. Y.
3	Washington, D. C. Virginia Atlanta Birmingham New Orleans	W. W. Varney, Baltimore, Md.	
4	Rochester Buffalo Toronto (Ont.) Erie Cleveland	B. S. Hughes, Buffalo, N. Y.	L. S. Lacy, Syracuse, N. Y.
5	Milwaukee Chicago Indianapolis Detroit Cincinnati	W. M. White, Milwaukee, Wis.	J. D. Cunningham, Chicago, Ill.
6	St. Paul-Minneapolis (Minnesota Sec.) St. Louis Mid-Continent Colorado Houston	F. E. Bausch, St. Louis, Mo.	D. E. Foster, Tulsa, Okla.
7	Los Angeles San Francisco Oregon Washington State	B. O. Eastwood, Seattle, Wash.	H. L. Doolittle, Los Angeles, Cal.

William B. Gregory Nominated to Vacant Vice-Presidency

TO THE MEMBERS OF THE COUNCIL:

Gentlemen:

Your committee appointed by the President to serve as a Committee to nominate a Vice-President to fill the unexpired term of John R. Allen has been guided by the following considerations:

a Geographical distribution of members of the Council.

b The recognition of the stamp of general endorsement of the Society as a whole which has already been expressed through the election of certain members as Managers.

c The belief that the experience gained as Manager will materially add to effective and efficient service as Vice-President.

Based on these considerations your Committee takes pleasure in nominating William B. Gregory, of New Orleans, La., to fill the vacancy, i.e., until the Annual Meeting, 1921.

Respectfully submitted,

ROBERT H. FERNALD,
FRED R. LOW,
E. S. CARMAN.

December, 6, 1920.

Professional Sections Notes

Gas Power Section. The Council has formerly approved the petition of members for the formation of this section "to promote the mechanical engineering of gas power and to keep the membership generally informed regarding current developments in this field by preparation of professional papers or by discussion or debates at meetings of the sections or at meetings of the Society."

The petition was transmitted by Mr. George A. Orrok and 356 members have now registered in the Section.

Textile Section. At a meeting held in the office of Past-President Main in Boston on November 12, a petition for this Section was drawn up and transmitted to the Council by George H. Perkins. The Council has accepted the petition and authorized the Section. Two hundred and eighty members have jointed the Section so far.

A session was held on December 10 in connection with the Annual Meeting of the Society, and Mr. Charles T. Plunkett, Past-Vice-President of the Society and former chairman of the Sub-Committee on Textiles of the Committee on Meetings, presided.

The result of the letter ballot for the election of officers for the Textile Section is announced as follows:

Executive Committee:

CHARLES T. PLUNKETT, *Chairman*, Adams, Mass.
SIDNEY B. PAINE, *Vice-Chairman*, Boston, Mass.
CHARLES R. MAIN, Boston, Mass.
WILLIAM D. HARTSHORNE, Methuen, Mass.
JAMES A. CAMPBELL, Pawtucket, R. I.

Secretary:

GEORGE H. PERKINS, Boston, Mass.

Ordnance Section. The petition signed by 172 members of the Society requesting the formation of an Ordnance Section was approved by the Council at its meeting held on December 10.

The organization meeting was held on December 9 at which Col. C. L. H. Ruggles, Ordnance Department U.S.A., representing the Chief of Ordnance, requested the coöperation of engineering societies in the consideration of ordnance problems.

Materials Handling Section. This section held an informal meeting on the Adjournment of the Transportation Section of the Annual Meeting of the Society, held in New York on Thursday, December 9.

The Executive Committee of this Section is anxious to determine the desires of the membership as to the activities to be pursued. To assist in this, they ask that all members interested in material handling answer the following questions and send their answers in to Society Headquarters as soon as possible:

1 In what phases of Material Handling are you personally and directly interested? [(*a*) Types of equipment; (*b*) Applications, (*c*) Economic-costs, etc.]

2 From this personal viewpoint, how can the Material Handling Section function to best serve you? Please elaborate fully.

3 In what broad ways can this Section coördinate the work of engineers in all branches of Material Handling so that each man who is interested in a part of the problem may see his relation to the problem as a whole?

4 Have you in your work encouraged certain phases of Material Handling which touched general economic problems, and how?

5 What is the character of papers you would be most interested in? [(*a*) Descriptive of Applications; (*b*) Descriptive of Apparatus; (*c*) Applications as to Industries; (*d*) Which papers are of most value to you: those which discuss details of a problem or those which give a broad picture of a general problem to be discussed in detail? (*e*) Economic.]

Local Sections Celebrate Fortieth Anniversary by Simultaneous Meetings Throughout the Country

IN its December issue MECHANICAL ENGINEERING presented an account of the special meeting held in New York to celebrate the Fortieth Anniversary of the first meeting of the Society and at which addresses were made by J. Herbert Case, Samuel Gompers, and William B. Dickson on the Opportunity and Responsibility of the Engineer. Simultaneously with this successful meeting the Local Sections held meetings throughout the entire country, and each gathering, containing in its program features common to all other meetings, became not a separate celebration, removed and disconnected from the whole, but in a very real sense a session of a larger gathering.

This unity was effected through phonograph speeches by President Miller and Past-President Hollis, which were prepared in the laboratory at Waterbury, Conn., of one of our members, Prof. Wm. H. Bristol. Those who heard these records and whose comments have been received at Society Headquarters—especially those in the far-distant Sections—tell of the inspiration which came as a result of hearing the voices of President Miller and Past-President Hollis, and realizing that in all parts of the country engineers were likewise listening to the same voices.

Again, greetings were received from all over the world and read at all the meetings. British, French, Belgian, Italian, and Cuban engineering societies, besides a host of engineers of high achievement in foreign countries and some Honorary Members of our Society, all sent messages of felicitation. Notable American engineers also added their contribution in the way of greetings and President-Elect Harding telegraphed: "The Administration which comes into power next March fourth very much wishes the advice and cooperation of the membership."

From the foregoing features the programs were varied in infinite ways. Some meetings were formal, others informal; some included excursions and trips of inspection, others the reading and discussing of papers; some were banquets, other smokers; but whatever the form, all centered around the unity of thought which, reviewing the accomplishments of the past, gave inspiration for the future. Brief accounts of the various Section meetings follow.

BOSTON

Members of the Boston Section to the number of 300 met at the City Club for a formal dinner at which Past-President Main presided. Mr. Main reviewed the growth of the Society and declared that "service" had always been its motto—"Service to the members, service to the public, and service "to science." Other speakers of the evening were F. W. Dean, former Vice-President, who gave an intimate sketch of the lives and attainments of the early members of the Society; A. E. Baird, of Caines Institute, who told of the scientific inventions of the early magicians and priests, and La Rue Vredenburgh, who discussed the human element in engineering. The Boston Section also sent greetings to all the other Sections, and relayed greetings which it received from President-Elect Harding, Governor Coolidge, and Mayor Peters.

PROVIDENCE

The Providence meeting, held in the rooms of the Providence Engineering Society, was preceded by a dinner at the University Club. Luther D. Burlingame gave some reminiscences of the early days of the Society and of the meetings held in Providence in 1872. C. E. Emmons, a chemist with The Texas Company, spoke on Oil Refining. The following day the Section made a trip to the plant of the Standard Oil Company at East Providence.

WORCESTER

The Executive Committee in Worcester has arranged for the coming year a series of talks and discussions on Worcester Industries. The Fortieth Anniversary Celebration was the first of the series and the subject was Steel. George I. Alden presided and gave a brief account of the accomplishments of the Society and outlined what he conceived to be its future field of usefulness. Jerome R. George spoke on the subject of A Unique Rolling Mill.

WASHINGTON

The Washington, D. C., Section had a meeting worthy of the capitol city. Professor Fernald was a guest and reviewed the work and history of the Society and its place among the other technical societies. He made a plea for the whole-hearted support of American Engineering Council. Commander W. R. Purnell, U.S.N., in charge of the fuel-oil testing plant at the Philadelphia Navy Yard, also spoke and gave some Points on Burning of Fuel Oil. His paper covered many practical points on fuel burning, including the design of spray nozzles, tolerances, mixtures, etc. The Manufacture of Gas as an Industrial Fuel was discussed by Thomas King, superintendent of fuel sales, Consolidated Gas, Electric Light and Power Co. of Baltimore and C. L. Davison, engineer with the General Electric Co., Philadelphia, spoke on Flow Meters.

CONNECTICUT BRANCHES

The Connecticut Section celebrated the Anniversary by Branch meetings in Waterbury, New Haven, and Hartford. In a very real sense the meeting at Waterbury was the keynote session of the anniversary, for it was at the Platts Mills Laboratory of Professor Bristol that the phonograph records by President Miller and Past-President Hollis were synchronized with the moving-picture films. It was the first public exhibition of the synchronizing device, and the members in attendance were justified in their pride of feeling that they were at the very center of things on that occasion.

The Bridgeport, Meriden, and New Haven Branches met at New Haven during the afternoon and evening. The afternoon meeting was held at the Mason Laboratory of Yale University and J. R. Caldwell gave a talk on the new plant of the Seamless Rubber Co. at New Haven. Afterward the ninety-five members and guests present were conveyed by automobiles to the plant where two hours were spent in its inspection. The evening session was held at North Sheffield Hall, in order to accomodate the audience of three hundred attracted by the meeting on superpower. Professor Breckenridge presided and introduced W. S. Murray, chairman of the engineering staff of the Superpower Survey, who presented very fully the plans of the survey.

At Hartford Professor Greene was present to tell the members something of the work of the Society in the past, and the larger work it is going to do in the future. F. T. Moore, of the Colt Manufacturing Co., reviewed the early history of his company and the development of firearms; and H. B. Maxim discussed the development of the automobile industry in Hartford.

INDIANAPOLIS

The observance by the Indianapolis Section was in the form of a dinner at the University Club in that city. Following the dinner, Chairman Brossman welcomed the members and guests, and the secretary read the telegrams of congratulation. Dr. C. L. Mees, president emeritus of Rose Polytechnic Institute, was the guest of the evening and gave an address on The Past and Future of Engineering. Dr. Mees showed that in the past the advancement of the world came with the advance in the knowledge of engineering and stated that in the future the same conditions would probably prevail.

ONTARIO

The celebration by the Ontario Section was held in the School of Science Building at the University of Toronto. Prof. James Trail gave an illustrated talk on the Power Canal of the Chippawa development of the Hydro-Electric Power Commission. After the lecture an attempt was made to get in touch by wireless telephone with the Boston Section, which was sending out messages in connection with its part of the anniversary celebration. The local receiving apparatus was working perfectly and picked up messages from a number of sources, but none from Boston.

Atlanta-Birmingham

The Atlanta Section made an inspection of the Federal Prison during the afternoon of the fifth and also visited the plant of the Hansom Motor Car Company. Earl F. Scott, a manager of the Society, reviewed the history of the Society and Dr. J. S. Coon, of the Georgia School of Technology, one of the twenty-five living organization members of the Society, told a short story respecting each one present at the first annual meeting.

At Birmingham the occasion was marked as the fifth anniversary of the Local Section. The program began at 11.00 a.m. by a visit to the model plant villages for white and colored employees at Acipco. Lunch was served in the American Cast Iron Pipe and Foundry Company's dining room and short talks were given by John Moore, chief engineer and J. R. McWane, president of the company. Other trips of inspection were made during the afternoon, and at 6.00 p.m. the party returned to the Southern Club for dinner. While there was no set program in connection with the dinner, A. M. Kennedy, who has been connected with the laboratory of Thomas A. Edison, gave a short but interesting talk on the manufacture of phonograph records and the technic of recording.

Akron-Columbus-Cincinnati-Toledo

The meeting at Akron was held in the rooms of the Engineering Society of Akron. Prof. F. O. Ellenwood, chairman of the Akron Section, presided. The attendance was small but those present enjoyed the meeting, renewed and increased their loyalty to A.S.M.E., increased their knowledge of its past and obtained additional confidence in its future.

Columbus celebrated by a dinner at the Southern Hotel. Col. E. A. Deeds, of Dayton, was the guest of the evening and delivered an address. His subject was Some Observations on My Recent European Trip, and these covered the political, industrial, and economic conditions of Europe. It was followed by a request for greater civic service by Col. H. M. Bush in connection with certain municipal utilities and the police department of Columbus.

Cincinnati's celebration was carried out by a dinner at the Business Men's Club. James B. Stanwood, former manager of the Society and who had been a member longer than any other person present, gave some very interesting reminiscences of his acquaintance with certain of the founders of the Society, particularly Prof. John E. Sweet and Alexander L. Holley. George W. Galbraith also spoke of the work of the mechanical engineers in Cincinnati who were early associated with the Society, and of the development of the Cincinnati Section in 1912.

Toledo celebrated the anniversary on the fourth of November, and besides the features uniform at all meetings, a paper on New Developments in Steam Distribution was presented by George H. Hartman of the Locomotive Appliance Company. A small demonstrating model of a locomotive cylinder with one drive wheel, connecting rods and complete valve gear of the new type was on display at the meeting. Mr. Hartman gave a short history of the developments in the use of steam, and discussed the essential features and advantages of the new type of valve gear. This new mechanism was invented and designed by Mr. Chas. J. Pilliod of the Locomotive Appliance Co.

Philadelphia

The Philadelphia meeting was in the form of a smoker held in the Hotel Adelphia Roof Garden. The arrangements were quite elaborate—including music, entertainment, and refreshments. Past-President Hollis was a guest and delivered an address on The Engineer's Place in History. The other speaker, Benjamin Lichty, vice-president of The Eisenlohr Company, gave a very interesting and instructive talk on The Manufacture of Tobacco.

San Francisco

At San Francisco an excursion was made to the Mare Island Navy Yard, where through the courtesy of Capt. E. L. Beach, U. S. N., Commandant of the Yard, the members of the Local Section and their friends inspected the U.S.S. *California*, now nearing completion. The battleship is by far the largest vessel ever constructed on the Pacific Coast and typifies all that is modern in naval design. Luncheon was served at the Navy Yard as the party did not return to "Frisco" until 6 p.m. Dinner was served on board the boat homeward bound.

Chicago-Colorado

The anniversary was celebrated by the Chicago Section on November 22. Short addresses appropriate to the occasion were given before the speaker of the evening, Dr. G. O. Smith, Director of the United States Geological Survey at Washington, was introduced. Dr. Smith gave a most interesting and instructive talk on Industries' Supply of Energy.

Colorado also celebrated late in the month—on the twenty-fourth. The meeting was held as a dinner at the Metropole Hotel. Dr. George H. Norlin, president of the University of Colorado, was the guest of the evening and spoke on Engineering at the University. Mr. Wilkinson, chairman of the Local Section, reviewed the activities of the Society.

Detroit

The Detroit Section observed the anniversary by meeting jointly with the Detroit Engineering Society. Henry M. Leland, president of the Lincoln Motor Car Company, gave a brief history of the founding, growth and service of the Society, and E. J. Mehren, editor of the *Engineering News-Record*, spoke on An Engineer's Observations in Europe.

Cleveland

Dean Alfred Ayers, of the School of Engineering in Akron University, presided at the Cleveland celebration which was held in the Hotel Statler. Addresses were made by President-Elect Carman, Past-President Worcester R. Warner, of the Warner Swasey Company, and William R. Rose, Associate Editor of the Cleveland *Plain Dealer*. Forecasts of the Society's work and advancement were made by the speakers and Mr. Carman prophesied that the present membership would be doubled during the next forty years. Past-President Ambrose Swasey, who with Mr. Warner and Mr. Charles F. Brush was a charter member of the Cleveland Section, was unable to attend the celebration because of illness.

Other Section Meetings

At New Orleans the Local Section met at Tulane University; Washington State celebrated jointly with the Student Branch at the University of Washington; and Baltimore met with the Engineers' Club of Baltimore to hear Morris L. Cooke, of Philadelphia, deliver an address on The Inspiring Outlook Before American Engineering. Los Angeles entertained Prof. Carl C. Thomas, of the Dwight P. Robinson Company, as its guest. The Minnesota Local Section held a Ladies' Night and met in the Palm Room of the St. Paul Hotel. Members of all engineering societies in the State were invited. The big Houston-Mid-Continent joint meeting at Dallas on October 15 and 16 mitigated against the holding of anniversary meetings by these Sections, but Mid-Continent persisted in her enthusiasm and carried out a simple program at Tea Cup Inn, Tulsa, Okla. St. Louis was similarly affected by other arrangements, but met at the residence of Clarence H. Howard for an informal discussion. Syracuse held an informal dinner and smoker at the Chamber of Commerce Club House.

A War Memorial

A unique and splendid War Memorial has been prepared in recognition of employees of the Brown and Sharpe Manufacturing Company who served either at home or abroad during the Great War. This memorial is in the form of a booklet, of nearly one hundred pages, containing portraits of the boys who lost their lives, together with an account of the service they rendered; an honor roll of the 911 men who entered active service, giving their length and branch of service; records of distinguished service and extracts from letters giving accounts of service and experiences and a record of the service of employees remaining at the factory, describing their participation in various war funds and activities, as well as splendid coöperation in the work of the factory itself. The employees of the Brown and Sharpe Manufacturing Company made an honorable and a distinguished record which it is purposed to perpetuate by this memorial booklet.

Annual Reports of A.S.M.E. Standing Committees

THE annual reports of the Standing Committees of The American Society of Mechanical Engineers were received by the Council at its meeting in Washington on November 17. They were ordered printed and made available to the membership at the Annual Meeting in December. A complete report of the Financial Committee is printed herewith, as it is believed that its importance warrants full distribution to the membership. Compete copies of the remaining reports, a synopsis of which is printed on page 7, may be obtained upon request.

Report of Finance Committee

TO THE COUNCIL:

The total gross receipts of the Society from all sources for the fiscal year, October 1, 1919, to September 30, 1920, were $433,899.07, and the gross expenditures chargeable to current receipts were $426,666.91, leaving an excess of receipts over expenditures of $7,232.16.

Deducting from the gross receipts the amounts spent (*a*) to handle new membership applications, (*b*) to secure and produce the advertising in the publications, (*c*) to handle sales of publications, and reserving $21,300.00 for obligations undertaken but not completed at the end of the fiscal year, the net current income was $285,001.81, and the expenditures chargeable against this income $277,769.65, leaving an excess of $7,232.16 as above. The net figures indicate the amounts received and spent for committee activities.

Appended are the audited reports of the accounts of the Society for the fiscal year ended September 30, 1920.

Based on a membership of 11,750 (the average of the total membership for the year, October 1, 1919, to October 1, 1920), the average gross current receipts of the Society per member for the fiscal year just closed are tabulated below. The corresponding receipts for the preceding year are included for comparison.

AVERAGE GROSS RECEIPTS PER MEMBER

	1918–1919	1919–1920
Membership Dues	$13.56	$14.40
Initiation Fees	3.64	3.47
Sales—Gross Receipts	3.12	4.30
Advertising	11.38	14.00
Interest and Discount	0.94	0.69[1]
	$32.64	$36.86

[1] About 20 cents per member. Interest transferred for life members and members whose dues were remitted.

Based on the same average membership, the expenditures per member for the fiscal year just closed are also given below, together with the corresponding expenditures per member for the previous year for comparison.

AVERAGE GROSS EXPENDITURES PER MEMBER

	1918–1919		1919–1920	
Meetings, Annual and Spring		$ 1.45		$ 1.32
Publications:				
Journal (MECHANICAL ENGINEERING)	9.79		11.40	
Condensed Catalogues	2.42		3.65	
Transactions	2.50		2.81	
Year Book	0.96		1.32	
		15.67		19.18
Membership and Increase of Membership		1.48		0.47
Office Administration		3.94		4.23
Upkeep of Headquarters		0.69		0.10
Aims and Organization and Joint Conference Committee		0.62		0.25
Joint Activities:				
Assessment to U. E. S.	0.51		0.58	
Library	0.45		0.55	
Engineering Council	0.38		0.42	
Employment Bulletin	0.23		0.24	
American Engineering Standards Committee	....		0.13	
		1.57		1.92
Local Sections		1.97		2.76
Council, Contingencies, Mileage		1.66		1.22
Student Branches		0.04		0.08
Cost of Sales (Publications, Pamphlets, etc.)		1.69		3.43
Engineering Committees (Standardization, Research, Boiler Code, Power Test Codes, etc.)		1.36		1.29
Professional Sections		....		0.11
Other Activities		0.29		0.14
TOTAL		$32.43		$36.50

Expenditures do not reveal that the original requests of committees for appropriations were over $40,000 in excess of available income, and that to keep expenditures within income necessitated a curtailment of activities represented by that amount, about 12 per cent. The responsibility for this curtailment was assumed by the Finance Committee as an obvious duty.

DEVELOPMENT WORK

In addition to the activities charged to current income, the Publication and Papers Committee continued its development of MECHANICAL ENGINEERING, the expenditures incurred during the year being charged against the three-year loan from Reserve granted by the Council last year and to be repaid.

Also, the Local Sections Committee, under similar authority, undertook an aggressive campaign to develop the membership, which will show results in next year's return, and the money thus spent will be repaid.

The statement of these development activities is as follows:

	Authorized	Expended
MECHANICAL ENGINEERING (Three-Year Loan)	$19,000.00	$9,161.33
Development of Membership	8,600.00	8,600.00

AUTHORIZATIONS FROM RESERVE ACCOUNT

In addition to the above two items charged against Reserve, the Council also authorized to be taken from this account $2,500 additional for Research, $2,000 additional for Engineering Council and $1,000 additional for Joint Conference Committee.

As offsetting these withdrawals from Reserve, the $7,232.16 excess of current income over current expenditures was by direction of the Council turned back into Reserve, to be applied as a repayment against the amount borrowed from that fund for development work.

The statement of reserve account is as follows:

STATEMENT OF RESERVE ACCOUNT AS OF OCTOBER 1, 1920

Reserve, October 1, 1919		$151,973.52
Excess of current income over expenditures, 1919–20		7,232.16
		$159,205.68
Less expenditures from Reserve as follows:		
Excess expenditures over anticipated for unfilled obligations 1918–19	$ 4,175.81	
Cancelled arrears	3,104.52	
Expenditures for Journal Development ($9,000 loan for 3 years authorized by Council)	9,161.33	
Expenditure for membership development authorized by Council	8,600.00	
Additional assessment for Engineering Council, authorized by Council	2,000.00	
Additional expenditure for Research, authorized by Council	2,500.00	
Additional assessment for Joint Conference Committee, and loaned by Council	1,000.00	
	$30,541.66	
Reserve, October 1, 1920		$128,664.02

NEW FISCAL YEAR

As great as are our expenditures, both relatively to other societies and absolutely, nevertheless the activities of the past two years have necessarily been restricted to keep current expenditures within income. Unless additional income is forthcoming, the same policy will have to be pursued next year.

For 1920–1921 the Finance Committee estimates the total current income available from the several sources as follows:

	Estimated Gross Income	Estimated Net Income
Membership Dues	$195,000	$173,210[1]
Initiation Fees	51,000	41,440[1]
Interest	7,000	7,000[1]
Advertising:		
MECHANICAL ENGINEERING	130,000	75,000[2]
Condensed Catalogues	70,000	25,000[2]
Sales	72,500	25,000[3]
	$525,500	$321,650

[1] Rebate (estimated) of $9,650 to Local Sections deducted.
[2] Cost of production deducted.
[3] Cost of handling deducted.

The Finance Committee has accepted for the time being the responsibility of restricting appropriations to bring them within the above estimated income, and has made the following tentative recommendations of appropriations:

	Recommended Appropriations
Membership and New Members	$ 28,000
General Meetings	16,500
Publications (MECHANICAL ENGINEERING, Transactions, Condensed Catalogues, Sales)	267,000
Council and Mileage	14,000
Local Sections	40,000

Professional Sections	4,000
Standardization, Research, Power Test Codes	12,000
Boiler Code	6,000
Library	8,000
House	1,350
Student Branches	2,500
Federated Societies and Joint Conference Committee	15,650
Engineering Council to Jan. 1	1,250
Employment Service to Jan. 1	750
American Engineering Standards Committee	1,500
Office and General Expense	55,000
United Engineering Society (Rooms)	7,000
Reserve	25,000
Unexpected Activities	20,000
	$525,500

Since these recommendations involve considerable restriction of the activities which do allow of curtailment (being neither income-producing nor fixed charges), the Council instructed the Finance Committee and the Committee on Local Sections to submit the financial situation to the Local Sections delegates, who will assemble at the Annual Meeting of the Society and ask an expression of their views as to what should be done, and specifically, whether they think the members of the Society would be favorable to an increase in dues. A restricted program of activities during the coming year is unavoidable without an increase in income.

It is not perceived, however, how any additional income of moment can be secured in the coming year. Even if, after full study of the question, it should be deemed advisable to submit to the membership the question of increasing the dues, and upon such submission the members should vote in favor of the increase, the change to higher dues could not become effective till a year hence. Serious as the necessary curtailment is going to be, it is the opinion of the Finance Committee that the situation should be faced frankly and the expenditures kept within the income. Current activities should be paid for out of current income. The Society should not, as it seems to the Finance Committee, trench further upon its reserve.

It is the opinion of the Finance Committee that the reserve should be built up to the point where it equals fifty per cent (50%) of the annual gross income of the Society, and that to this end, five per cent (5%) of the annual gross income of the Society should be set aside and added to the reserve. Thus, the expected gross income this coming year being $525,500, the reserve ought to be at least $260,000, instead of $128,000 as it is, and $25,000 should be set aside and added to the reserve this year. It should be borne in mind that of the $128,000 reserve, only about $90,000 is liquid, and must perform the function of working capital as well as reserve. There has been a depletion of the reserve, and there should now be, as it seems to the Finance Committee, a determined effort to reverse the process, and again build up the reserve. There is but one way to do this, and that is to cut the garment according to the cloth. Otherwise the Society will surely get into financial trouble at no distant date.

Respectfully submitted,

George M. Forrest, *Chairman*
Frank E. Law, *Vice-Chairman*
Louis C. Marburg
Erik Oberg
Charles P. Coleman
Finance Committee.

REPORT OF ACCOUNTANTS

Finance Committee,
The American Society of Mechanical Engineers.

Dear Sirs:

In accordance with your instructions, we have examined the books and accounts of The American Society of Mechanical Engineers for the twelve months ended September 30, 1920.

The results of this examination are set forth in the two exhibits, attached hereto, as follows:

Exhibit A—Balance Sheet, September 30, 1920.
Exhibit B—Income and Expenses for the twelve months ended September 30, 1920.

We certify that, in our opinion, the accompanying Balance Sheet is a true exhibit of its financial condition as of September 30, 1920, and that the attached statement of Income and Expenses is correct.

Respectfully submitted,
(Signed) Wm. J. Struss & Co.,
Certified Public Accountants.

EXHIBIT A

September 30, 1920, Balance Sheet

ASSETS

Society's one-quarter Interest in the Building, Land and Real Estate Equipment, No. 25 to No. 33 West 39 Street		$486,792.79
Library Books	$13,000.00	
Furniture and Fixtures	5,000.00	
		18,000.00
Stores, including plates and finished publications		36,216.56
Engineering Index		10,000.00
Trust Funds Investment:		
Liberty Bonds	7,000.00	
New York City 3½%, 1954 (par $45,000)	39,696.81	
St. L., Peoria & N. W. 1st 5%, 1948 (par $10,000)	10,613.89	
United New Jersey Canal Co. (par $1000)	970.00	
Cash in banks representing Trust Funds	753.78	
		59,034.48
Liquid Assets:		
Liberty Bonds	48,000.00	
United Engineering Society	2,500.00	
Accounts Receivable:		
Members' Dues $17,810.42		
Initiation Fees 8,169.58		
Sales of Publications, Advertising, etc. 84,438.87		
	110,418.87	
Cash: In banks for general purposes 4,643.63		
Petty Cash Fund 2,000.00		
	6,643.63	
		167,562.50
Advance Payments		33,972.96
Unexpended Appropriation 1918–19		4,175.81
		$815,755.10

LIABILITIES

Trust Funds:		
Life Membership	$46,326.92	
Library Development	4,902.71	
Week's Legacy	1,957.00	
Melville Medal Fund	1,138.86	
Hunt Memorial	208.99	
Hess Juniors' Prize	1,000.00	
Hess Students' Prize	1,000.00	
Charles T. Main Award	2,500.00	
Total		$59,034.48
Notes Payable		39,603.33
Accounts Payable		18,323.35
James Watt Memorial		296.00
Initiation Fees uncollected		8,169.58
Replacement Fund		1,163.18
Dues paid in advance		2,471.23
Unappropriated Revenue		8,899.07
Unexpended Appropriation 1919–1920		14,133.09
Capital Investment	514,792.79	
Surplus and Reserve	148,869.00	
		663,661.79
		$815,755.10

EXHIBIT B

INCOME

Membership Dues		$169,567.28
Interest		8,122.88
	$40,805.42	
Initiation Fees	5,589.48	
		35,215.94
	102,145.41	
Advertising	63,812.54	
		38,332.87
	62,484.82	
Condensed Catalogues	39,421.23	
		23,063.59
	50,773.26	
Sales	40,074.01	
		10,699.25
Total		285,901.81

EXPENSES

Office and Supervision	$49,725.11
Assessments	24,485.40
Council and Contingencies	14,340.21
Publications:	
Mechanical Engineering Text	70,804.09
Transactions	33,058.85
Year Book	15,599.68
Local Sections	32,191.03
Meetings, General	15,515.38
House	1,991.66
Student Branches	947.50
Research	3,947.67
Standardization and Technical Committees	13,720.23
Joint Conference Committee	1,979.05

Professional Sections	1,274.62	
Miscellaneous	3,689.17	
TOTAL[1]		283,269.65
Excess of Income over Expenses		$1,732.16

[1] The item of total expenses includes $21,300 not yet paid to complete work already in process and chargeable to this year's activities.

Extraordinary expenses amounting to $5,500 included in Current Expenses were authorized, by act of Council, to be taken from Reserve. This reduces Current Expenses by that amount, and, with the $1,732.16 shown as excess of income over expenses, $7,232.16 is turned back into Reserve, and by direction of Council is a repayment to be applied against the amount borrowed from Reserve for development.

Synopsis of Annual Committee Reports

Meetings and Program Committee. The rapid increase in size of the Spring Meetings led the Committee to solicit an opinion as to what character the Spring Meetings should assume in the future. This opinion was in favor of continuing the Spring Meetings at industrial centers and making trips to study engineering developments and industrial plants.

The Spring Meeting in Chicago in 1921 is planned to be of the nature of a congress of mechanical engineers, in coöperation with other mechanical engineering societies.

The Committee reported an agreement reached with the new Standing Committee on Professional Sections regarding the conduct of Professional Section meetings held at the Annual or Spring Meetings.

The Committee instituted a new work of publicity resulting in the formation of an informal Publicity Committee and the appointment of an experienced publicity man to assist in interpreting to the public the important activities of the Society.

Publication and Papers Committee. The report calls attention to the fact that all the publications have been maintained as in past years, and are self-supporting in spite of the large increases in manufacturing costs.

Membership Committee. Of the 3106 applications handled during the year, 1728 were recommended for membership or promotion. There were 446 Members elected, 503 Associate-Members, 587 Juniors and 67 Associates.

Local Sections Committee. Nine new Local Sections have been established, bringing the total number to thirty-eight.

The work of the former Increase of Membership Committee has now been turned over to this Committee.

The Local Sections conferences, held in connection with the General Meetings, have been successful and have developed important matters of Society policy.

The Committee recommends regional secretaries, as these in large centers could take care of the activities of the Local Sections of all national societies.

Professional Sections Committee. Seven months' activity has resulted in the formation of nine of the eleven sections authorized by the Council.

By-Laws governing the Professional Sections activity have been framed.

The total registration in the Professional Sections is now over 6000.

Six of the Professional Sections held sessions at the Annual Meeting, 1920.

The Special Committee, which was appointed by the Council to inaugurate this activity, has been discharged upon the organization of the Standing Committee, composed of the elected chairmen of the Sections.

Constitution and By-Laws Committee. Amendments to the Constitution and to the By-Laws for the year are enumerated.

The report recommends a revision of the Constitution, By-Laws and Rules, the Committee feeling that the present documents could be very much simplified. A Constitutional Convention is recommended to formulate the general policy of the Society after which it could be phrased.

House Committee. The duties of this Committee have, by act of Council, been referred to the Finance Committee, who will hereafter assume charge of all the rooms of the Society and their contents.

Research Committee. Progress reports of sub-committees on Lubrication, Bearing Metals, Fluid Meters, Heat Transmission, Permanency and Accuracy of Indication of Instruments, Riveted Joints, Cutting Action of Cutting Tools, and Vibration Strains in Shafting, are included.

The Committee has been coöperating with the Publication and Papers Committee by preparing the section on Engineering Research published in MECHANICAL ENGINEERING, and with the Committee on Local Sections through the appointment of local sub-committees on Research.

Standardization Committee. The work of this Committee has proceeded along three distinct lines, (*a*) presenting recommendations to the Council for the acceptance of sponsorships in standardization, proposed chiefly by the American Engineering Standards Committee, (*b*) forming sectional committees under the rules of the A.E.S.C., and (*c*) selecting members of the Society to represent it on sectional committees organized by other standardizing bodies in the United States.

The details of these activities are given in the report.

Boiler Code Committee. The Committee has continued its regular meetings for rendering interpretations of the Code.

Sub-committees on Boilers of Locomotives and on Air Tanks and Pressure Vessels have presented reports.

The maintenance of the affidavits covering the sale of boiler stamps is still continued, as well as the sale of the publications connected with the Code. The volume of this work has become very heavy.

Education and Training Committee. This is now a permanent Committee authorized by the Council on the recommendation of the Special Committee on Education Below College Grade, the actions of which Special Committee the report enumerates.

The Special Committee recommended a permanent Committee to communicate with other agencies and associations in regard to classifying and reporting the different systems of training for men in the industries, in the hope that greater unity of purpose in engineering education may be brought about.

The Committee recommends the formation of sub-committees (*a*) for relations with colleges, (*b*) for relations with public and private vocational schools, and (*c*) for relations with corporation schools.

Awards and Prizes Committee. The Special Committee recommends a permanent Committee to institute and administer the following awards by the Society: (*a*) Honorary Membership (*b*) Life Membership, (*c*) A.S.M.E. Medal, (*d*) Honorable Mention, (*e*) Scholarships or Fellowships, (*f*) Junior Medal (the present Junior Prize), (*g*) Two Student Medals (the present Student Prizes).

The report lists the funds already established and available to carry out some of these awards.

Code of Ethics Committee. This is the final report of the Special Committee on Code of Ethics, the first reading of which was made at the Spring Meeting of 1920.

The report recommends a Code of Ethics common to engineers of every branch of the profession and also to architects.

A comprehensive Code, consisting of fourteen clauses, is appended to the report. This has already been published in MECHANICAL ENGINEERING.

Weights and Measures. The Committee has concerned itself chiefly with watching metric legislation, and the report lists the organizations which have gone on record as opposing the compulsory adoption of the metric system, and also those which have favored it. The committee proposes to continue its work of securing facts which would form a basis for intelligent action.

Power Test Codes. The work of revising the individual codes of the Power Test Codes, inaugurated last year, has proceeded satisfactorily and two of the revised codes have been presented to the Council and order submitted to the Society for discussion before final adoption.

Coöperation with other Organizations. The usual appointments were made of representatives of the Society to coöperate in the numerous joint activities. The names of these activities and the members appointed are to be listed in the Year Book of the Society for 1921.

Recent Section Meetings

AKRON:

December 17. In the rooms of the Engineering Society of Akron. President E. S. Carman addressed the meeting.

ATLANTA:

December 28. "Impressions of the Annual Meeting," by N. C. Harrison of Atlanta, Ga.

BOSTON:

December 17. Joint meeting with the Boston Society of Civil Engineers. "Water Powers of New England," by H. K. Barrows, Cons. Engr., Boston, Mass. and W. S. Murray, Cons. Engr., New York City.

BUFFALO:

December 21. "Industrial Application of Electric Furnaces," by E. F. Collins, of the General Electric Company.

CHICAGO:

November 22. Celebration of the 40th Anniversary of the Society at the Sherman Hotel. "Industries' Supply of Energy," by Dr. G. O. Smith, of the U. S. Geological Survey, Washington, D. C. "The A.S.M.E.," by H. S. Philbrick. "Early Recollections of the Society," by Captain Robert W. Hunt.

CINCINNATI:

November 5. "The A.S.M.E.," by James B. Stanwood. "The Work of the Local Engineers," by George W. Galbraith.

COLORADO:

November 26. Celebration of the 40th Anniversary. Dr. George H. Norlin, Pres. of the University of Colorado, spoke on Engineering at the University of Colorado. "The Activities of the A.S.M.E.," by T. L. Wilkinson.

COLUMBUS:

December 10. "Emergency Work in Power Plant Operation," by E. A. Hitchcock, Dean Eng. College, Ohio State University. Movies of A. M. Byers Genuine Wrought Iron Pipe Manufacturing.

CONNECTICUT:

HARTFORD BRANCH:

December 6. "The Prevention of Grinding Wheel Accidents," by A. Rousseau, Norton Co., Worcester, Mass. "The Art of Grinding Becomes a Science in 1920," by W. H. Chapman of the same company. Both addresses were illustrated with lantern slides.

MERIDEN BRANCH:

November 23. "Making of Power," by George A. Orrok, Consulting Engineer, New York City.

WATERBURY BRANCH:

December 6. Mr. Darragh de Lancey gave a talk on his experiences in the Shipping Board.

DETROIT:

December 3. Joint meeting with Michigan Heating and Ventilating Society. "Modern Efficiency of Heating and Ventilating," by Dr. Hill.

LOS ANGELES:

December 11. Inspection of the Los Angeles Shipbuilding & Drydock Co. and then an inspection of the harbor was made by boat. In the evening, James Reed gave a talk on some of the interesting phases of his shipbuilding work.

METROPOLITAN:

December 3. Joint meeting with the A.I.E.E. and the Taylor Society. "The Three-Shift System in the Steel Industry," by Horace B. Drury, recently with the Industrial Relations Division of the U. S. Shipping Board. "The Point of View of the Manufacturer," by Wm. E. Dickson, Vice-President of the Midvale Steel & Ordnance Co.

December 15. Meeting of the New York Section A.S.C.E. Members of the A.S.M.E. were invited to attend. Subject: "The Port of New York."

ONTARIO:

November 19. Joint meeting with Toronto Branch of the American Society of Steel Treating. "The Manufacture of High-Speed Steel," by F. Kremp, Canadian Atlas Crucible Steel Co. This address was illustrated with motion pictures.

PHILADELPHIA:

December 13. Joint meeting with A.I.E.E. of Philadelphia. "Super Power Survey," by W. S. Murray, Chairman of the Super Power Survey, Department of Interior.

PROVIDENCE:

December 14. Joint meeting with Machine Shop Section, Providence Engineering Society. "The Engineer in a Republic," by Charles H. Norton, Norton Grinding Co., Worcester, Mass.

ROCHESTER:

November 26. Debate on "The Compulsory Adoption of the Metric System." Howard Richards, Jr. of New York City and Luther D. Burlingame of Providence, R. I. debated.

ST. LOUIS:

November 26. Mr. Hugh K. Warner spoke on "What Constitutes Jay Automobile Driving."

TOLEDO:

November 4. Celebration of the 40th Anniversary. "New Developments in Steam Distribution," by George H. Hartman, Locomotive Appliance Co., Toledo, Ohio.

WASHINGTON, D. C.:

December 2. "Development of Artillery Material," by Major G. F. Jenks, U. S. A. "The Scientific and Engineering Work of the Government," by Dr. Edward B. Rosa, Chief Physicist, National Bureau of Standards, Washington, D. C.

WASHINGTON STATE:

December 15. "Mechanical Engineering of Public Buildings," by E. L. Weber, Consulting Domestic Engineer.

Coming Section Meetings

Atlanta.

January 25. Joint meeting with Atlanta Section A.S.C.E. in Carnegie Library, Atlanta, Ga. Subject: Water Power Development, by B. M. Hall, Georgia Railway & Power Company, Atlanta, Ga.

Cleveland.

January 4. In Cleveland Engineering Society Rooms, Hotel Statler. Recent Developments and Modern Tendencies in Machine Design, by A. L. De Leeuw, 127 Water Street, N. Y. City.

Colorado.

January 28. At the Metropole Hotel. Industrial Expansion of Colorado, by Charles C. Gates, President Gates Rubber Company.

Columbus.

January 14. At the Engineers' Club, Southern Club. The Story of Petroleum (Motion Picture from the Bureau of Mines).

Connecticut.

Hartford Branch.

At the City Club. Mr. C. E. Lesher, Editor of *Coal Age*, will address this meeting.

Waterbury Branch.

January 3. In Chase Co.'s Office Building, Waterbury, Conn. Subject: Mining Experiences of a Prospector, by Capt. Harry George. Moving Pictures of Byers Wrought Iron Pipe will be shown.

Metropolitan.

January 28. At Engineering Societies Building. Subject: Marine Electrical Engineering, Mr. Alfred E. Waller in charge of meeting.

Philadephia.

January 25. At Engineers' Club of Philadelphia. Subject: Water Treatment for Boilers, by Julian S. Simsohn, Chemical Engineer.

St. Louis.

January 7. At the American Hotel. The Key Safety Hand-Hole Cap for Water-Tube Boilers, by Fred Key, Key Boiler Equipment Co.

Toledo.

January 11. At the Toledo Commerce Club. The Need of Business Training in Engineering, by Dr. Quillan, Toledo University.

PERSONALS

ARTHUR CUTTS WILLARD, professor of heating and ventilation in the department of mechanical engineering at the University of Illinois, has been appointed head of the department to succeed Dean C. R. Richards who since his election as Dean of the College of Engineering and Director of the Engineering Experiment Station has continued to serve as the acting head of the department of mechanical engineering.

JAMES W. NESBITT, formerly superintendent of the Johnson Company, Detroit, Mich., is at present employed as general superintendent of the Wisconsin Motor Mfg. Co., Milwaukee, Wis.

DONALD L. DERROM, formerly manager of manufacturing, The Isko Company, Chicago, Ill., is now with the Trading Engineers, Inc., Sao Paulo, Brazil, S. A.

ROBERT LACY announces his resignation from the Geo. T. Ladd Company, Pittsburgh, and appointment as sales engineer by the Rush Machinery Company, Pittsburgh, to act as their representative for steam equipment specialities and water-tube boilers.

H. M. LOWENSTEIN, formerly designer with the De La Vergne Machinery Company, is now designer for the Babcock & Wilcox Co., Bayonne, N. J.

WM. F. EPPENSTEINER, until recently with the U. S. Metals Refining Company of Chrome, N. J., is now connected with the American Smelting & Refining Co., Perth Amboy, N. J., in the Maurer, N. J., plant of that company.

JOSEPH J. ZUMBERG announces a change of position from assistant chief draftsman for the Cincinnati Milling Machine Company to chief draftsman for The Oesterlein Machine Company of Cincinnati, Ohio.

ROBERT LOCK, formerly president of the Vulcan Iron & Steel Co. of Pittsburgh, Pa., is now president of The Ashtabula Steel Company, Ashtabula, Ohio.

E. H. ALDWORTH, formerly assistant chief engineer with R. Martens & Co., Inc., New York; is now chief engineer with Livermore, Rojas & Co., Inc., New York.

R. J. S. PIGOTT, formerly industrial engineer for the Bridgeport Chamber of Commerce, is now with the Crosby Steam Gauge & Valve Co., Boston, Mass.

C. B. MANSFIELD, formerly with The Palmetto Phosphate Company, Tiger Bay, Fla., has been appointed supervising engineer for the International Agricultural Corporation, with office in Mulberry, Fla.

J. T. GEOGHEGAN has resigned his position as mechanical engineer, Southern Railway Lines West, at Cincinnati, and is now with the American Car and Foundry Company, Chicago, as sales engineer.

O. R. RANDOLPH has resigned his position as assistant engineer to the State Corporation Commission of Virginia and has accepted a position on the staff of the Moody Engineering Company, Inc., New York City.

L. W. BODINSON, formerly with The American Well Works, Aurora, Ill., is now vice-president of the Aurora Pump and Manufacturing Company, Aurora, Ill.

HERBERT A. CARHART, has resigned as assistant superintendent of the Lincoln Motor Company, Detroit, and organized the firm known as Carhart Bros. Foundry, Inc., Syracuse, N. Y., producers of gray-iron castings for textile machinery and other light to medium machine parts. Mr. Carhart is president and manager of the new firm.

EDWIN A. BYNUM, JR., is now construction foreman with the Production Department Engineers of the Humble Oil & Refining Co. at Cisco, Texas.

HENRY P. GALE is now associated with the Menomonee Falls Mfg. Co., Menomonee Falls, Wis.

G. B. NICHOLS, formerly chief engineer, Department of Architecture of the State of New York, and for the last eight months power specialist for the Du Pont Engineering Company, Wilmington, Del., has now been recalled by the State of New York to take charge of the construction of a military hospital to be built by the State of New York in conjunction with the Federal Government for the proper care of insane veterans of the World War. This hospital, which will have a capacity of 1000 beds, is to be built at Jamaica, L. I., at the earliest date possible. The actual construction of the buildings is being undertaken by the state.

THOMAS E. HYDE has become associated with The National Pipe Bending Company of New Haven, Conn., as factory manager. He was formerly works manager of the Huhn Manufacturing Company, Arlington, N. J.

W. S. QUIGLEY, president of the Quigley Furnace Specialties Company, New York City, has just returned from Europe after an extensive trip made in connection with large installations of the Quigley powdered-coal system in Italy and Belgium.

Prof. EDWARD J. KUNZE, head of the department of industrial engineering at the Pennsylvania State College, was elected a director and vice-president in charge of research, of the Society of Industrial Engineers at their convention held in Pittsburgh on November 10, 11 and 12, 1920.

C. F. MEYER, assistant secretary of the Landis Machine Company, Waynesboro, Pa., will leave shortly for an extended trip to the Orient in the interests of his company. Mr. Meyer will visit England, India, the Dutch East Indies, Australia, Philippine Islands, China, Japan and the Hawaiian Islands.

HARRY E. HARRIS, consulting engineer of the firm of Hubbard & Harris, Inc., now has associated with him Ralph K. Rowell, recently equipment engineer with the International Motor Corporation. Mr. Rowell has had an extensive experience in the automobile, truck and tractor line and will take care of this branch of the work for Hubbard & Harris, Inc. Mr. Harris has been elected president and Mr. Rowell vice-president of this firm, the name of which is to be changed to Hubbard, Harris & Rowell, Inc.

RICHARD FITZ-GERALD, with the Lybrand Ross Brothers & Montgomery, accountants and auditors, has been appointed associate manager of the Detroit office of that company. The practice of industrial accounting, cost finding and factory systematizing will be conducted under the supervision of Mr. Fitz Gerald.

GEORGE MACNOE is now associated with W. B. Connor, Inc., New York, engaged in the sale of power-plant equipment.

E. H. WHITNEY has recently become associated with the Westinghouse Lamp Company as district illuminating engineer of their New England office at Boston, Mass.

RAY MAYHEW, recently motor engineer with the American Hoist & Derrick Co., St. Paul, has taken a position with the Clyde Iron Works, Duluth, Minn.

LEON H. JOHNSON has severed his connection as general manager with the Anderson Foundry and Machine Co. and will in the future be at the head of an engineering firm specializing on oil-engine power plants as well as manufacturing oil engines, Anderson, Ind.

CHARLES G. KESHEN is now associated with The Gifford-Wood Company of Hudson, N. Y., as an engineer on coal-handling and conveying apparatus. He was formerly with The Lamson Company of Boston, Mass.

P. SBURLINO, formerly connected with Hare's Motors, Inc., at the Locomobile Plant, Bridgeport, Conn., has accepted a position in the engineering department of the National Cash Register Company, Dayton, Ohio.

GEORGE A. WARD, formerly with the Wilputte Coke Oven Corporation of New York City, is now connected with the engineering department of the International Coal Products Corporation, Newark, N. J.

P. J. BRYANT is now assistant to the works manager of The Wyman-Gordon Company, Worcester, Mass. He was formerly chief engineer at the U. S. Military Academy, West Point, N. Y.

C. H. ISRAEL, who was works manager for the National Marine Engineering Works, Scranton, Pa., announces that he has been appointed eastern representative for the Kingsford Foundry and Machine Works of Oswego, N. Y. Mr. Israel is located in the Philadelphia office of this company.

RALPH T. BRATT has severed his connection with Olney and Warrin, Inc., and is now employed in the industrial department of the Locomotive Superheater Company, New York.

W. A. B. HICKS, formerly assistant to the manager, I. P. Morris Department, Wm Cramp & Sons, Philadelphia, is now with the Dominion Engineering Works, Ltd., Montreal, Canada.

CHARLES L. LANGLOTZ is now assistant manager of the export division of H. H. Robertson Company, New York. He was formerly assistant regional manager of the Allied Machinery Company of America, New York.

WEBSTER TALLMADGE, who has been connected with the Westinghouse Electric & Mfg. Co., South Philadelphia Works, Lester, Pa., is now manager of the power division of Thomas A. Edison Industries, Orange, N. J.

WALLACE H. MARTIN has resigned as associate professor of mechanical engineering at the Pennsylvania State College and is now professor of heat engineering at the Oregon Agricultural College.

JOHN BRESLAV, formerly sales engineer, manager of publicity, and production manager of the Terry Steam Turbine Company of Hartford, is now owner of the J. B. Engineering Sales Company, of Hartford, which has recently been appointed Connecticut sales agent of the Conveyors' Corporation of America, formerly American Steam Conveyor Corporation. Mr. Breslav's company is also sales agent for the Griscom-Russell Company and the Terry Steam Turbine Company.

NECROLOGY

WILLIAM WALTER DINWIDDIE

William W. Dinwiddie, research and experimental engineer, Laboratory of Thomas A. Edison, Inc., Orange, N. J., died on October 6, 1920. Mr. Dinwiddie was born on November 4, 1876, in Greenwood, Va. He received his early education in the home schools and later attended the University of Virginia, from which he received the degrees of A.B. and M.E. For several years he was connected with the U. S. Naval Observatory as computer and during this period he was a member of eclipse expeditions to Georgia (1900), Sumatra (1901) and Africa (1905). From 1906 to 1908 he was connected with the Ames-Bonner Co., Toledo, Ohio, as superintendent. At the close of that period he became general manager for the Alvan Clark & Sons Corporation, Cambridgeport, Mass., manufacturers of astronomical instruments. For the past eight years Mr. Dinwiddie was associated with the Thomas A. Edison Co., Inc., first as manager of the disk record division and subsequently as research and experimental engineer.

Mr. Dinwiddie was a member of the masonic order. He became a member of the Society in 1915.

MURRAY WARNER

Murray Warner, Major in the Quartermaster Corps of the United States Army, died suddenly on October 2, 1920, in San Francisco, Cal. A military funeral was held on the afternoon of October 4 from the home of Mr. Walter Bliss (a Technology classmate of Major Warner's) with an escort of one battalion of infantry, pallbearers of non-commissioned officers and a military band. Services were held in the Presidio Chapel.

Major Murray was born on March 8, 1869, in Clinton, Ill. He was prepared for college in Phillips Academy, Exeter, and then entered the Massachusetts Institute of Technology, from which he received the degree of B.S. in 1892.

His first position was as draftsman with the American Wheelock Engine Co. where he remained two years, when he became connected with the California Engineering Co. From 1896 to 1900 he was with the International Power Co., his work dealing with the design and erection of power plants. In 1900 Major Murray was appointed by the American Trading Co. to establish an engineering department for them in China. Three years later the firm of Murray Warner & Co., consulting engineers and contractors, was established in Shanghai. In 1910 Major Murray retired from active engineering work not to enter it again until July 1917, when, as a "dollar-a-year-man," he was made construction quartermaster at Camp Dix, Wrightstown, N. J. In November, 1917, he was commissioned a Major in the Q.M.C. and put in charge of the utilities at Camp Dix where he served until the signing of the armistice. Major Murray refused a colonelcy in Washington, believing that he could render a greater service at Camp Dix. After the armistice he was transferred to the Mexican border, where he rendered unusually efficient service. At the time of his death he was stationed at San Francisco on General Liggett's staff, in charge of the utilities of the Western Department.

During the Spanish-American War, Major Murray had served as a lieutenant in the Navy. At the time of the Boxer Rebellion he was in charge of the American Company of Volunteers, organized to protect foreign settlement in Shanghai, China. He was twice president of the American Association of China, which represented and controlled all American interests in that country. He was a 32nd degree Scottish Rite mason, belonging to the Shanghai Chapter. He became a member of our Society in 1918.

ALEXANDER McDONALD GRAVER

Alexander M. Graver, vice-president and assistant general manager of the Graver Corporation, East Chicago, Ind., died on January 31, 1920, of pneumonia. Mr. Graver was born on May 15, 1883, in Alleghany, Pa. He attended the University of Michigan where he received the degree of B.S. in 1905 and M.S. in mechanical engineering in 1906. Upon graduation he became actively associated with the Graver Corporation. His first duties dealt with engineering on plant equipment. Later he became purchasing agent for the firm, and then sales manager, which position he held until January 1, 1920, when he was appointed vice-president and assistant general manager.

Mr. Graver was a member of several fraternal organizations. He became a junior member of the Society in 1908.

WALTER EDWARD MARSHALL

Walter E. Marshall, manager of the Buffalo office of the Warner & Swasey Co., died on August 5, 1920. Mr. Marshall was born on October 24, 1868, in Liverpool, England. He was educated in English schools. He came to this country in 1886 and entered the employ of the Warner & Swasey Co., Cleveland, Ohio, as an apprentice. Having completed his apprenticeship he was appointed foreman of the planer department. In 1892 he became superintendent and foreman for the Bardons & Oliver Co., Cleveland, where he remained until 1900 when he was offered the position of manager of Dyson and Sons' Forge Shop, also in Cleveland. In 1904 he returned to the Warner and Swasey Co. and for the past seven years was manager of their Buffalo office.

Mr. Marshall was a member of the Rotary Club of Buffalo. He became a member of the Society in 1919.

ALVA C. RICE

Alva C. Rice, who retired from active consulting work several years ago, died on July 8, 1920, in Worcester, Mass. Mr. Rice was born on July 23, 1845, in Nicholville, N. Y. He received a common-school education and began work in a flour mill. He became interested in millwright and contracting work and for a time was employed in this business in northern New York. In 1874 he became associated with the Holyoke Machine Co., Holyoke, Mass. having charge of the wood-shop and millwright work. Later he built the Worcester shops for this company and upon their completion became superintendent. In 1885 he removed to Dayton, Ohio, as superintendent and engineer for the Stillwell & Bierce Manufacturing Co., in which position he remained until 1899 when he returned to Worcester and opened consulting offices. His work was mostly on hydraulic power plants and pulp and paper-mill installations and until his retirement he was considered one of the leading engineers in those lines.

He was the designer of plants for the Chambly Manufacturing Co., the Hudson River Power Co., Montmorency Electric Power Co., Belgo-Canadian Pulp Co., Paul Smith Hotel Co., Hartford Electric Light Co., Greenfield Electric Light Co., and many others. He was also the designer of the Lachine Rapids turbine installation on the St. Lawrence River, and served as consulting engineer on several of the Niagara Falls plants and the plant of the St. Lawrence River Power Co. at Massena, N. Y.

Mr. Rice was a member of the masonic order. He became a member of the Society in 1890.

SAMUEL A. LINTON

Samuel A. Linton, chief of the estimating department of the Pratt & Whitney Co., Hartford, Conn., was killed in an automobile accident at Milford, Conn., on August 9, 1920. Mr. Linton was born on September 11, 1860, in Hartford, Conn. and received his early education in that city. At the age of seventeen he entered the employ of Pratt & Whitney as an apprentice machinist and tool maker. Twelve years later he became foreman of the machine-tool department of Morris Tasker & Co., Philadelphia. In 1890 he became connected with the S. S. White Dental Co as foreman of their instrument department. In 1892 he returned to the Pratt & Whitney Co., and with the exception of two years with the C. J. Smith & Sons Co., Milwaukee, and three years with the Ideal Machine Co., Hartford, was with the company until the time of his death. For the past 14 years he held the position of chief of the estimating department.

Mr. Linton became a member of the Society in 1918.

WILLIAM T. PRICE

William T. Price, chief engineer of the oil-engine department of the Ingersoll-Rand Co., died on November 7, 1920. Mr. Price was born on September 28, 1883, in Montreal, Quebec, Canada. He was graduated from Cornell University in 1906 with the degree of M.E. His first employment was with the Wheeling Mold & Foundry Co. as assistant engineer, where he was located for about a year when he became works manager of the Contractors' Plant Manufacturing Co. In 1908 he became connected with the De La Vergne Machine Co., as sales engineer and during the course of the next six years held the positions of sales manager, chief engineer of the power department and manager and chief engineer. At the time of his death he was actively associated with the Ingersoll-Rand Co. as chief engineer of the oil-engine department. He was also vice-president of the Rathbun-Jones Engineering Co., Toledo, Ohio.

Mr. Price was a member of the Society of Automotive Engineers and the Engineers' Club of New York. He became a junior member of the Society in 1910 and was promoted to full membership in 1915.

PERCY BELL TAYLOR

Percy Bell Taylor, consulting engineer in mechanical and electrical lines, Newark, N. J., died at his home in that city on October 21, 1920. Mr. Taylor was born in Manchester, England, on May 26, 1865, and when eight years of age came to the United States. In 1881 he entered the employ of Cyrus Currier & Sons, machinists, at Newark, N. J., and remained with that organization for sixteen years, during which time he occupied various positions, finally becoming mechanical engineer for the company.

He later organized the Taylor-Martin Co., designers and manufacturers of special machinery and tools. In 1897, Mr. Taylor dissolved this organization to engage independently as a consulting engineer. Many notable power-plant, machinery and general engineering installations were made under his design and supervision. Of recent years, Mr. Taylor undertook complete plant construction, including power and electrical installations as well as machinery. For a number of years he was employed as consulting expert by the Board of Education for the installation of heating and ventilating equipment and electrical apparatus in the local public schools.

Mr. Taylor was a registered architect in New Jersey and a member of the New Jersey Society of Architects and of the Board of Trade. He also belonged to several clubs and to the masonic order. He became a member of the Society in 1909.

CLARENCE VOSE

Clarence Vose, who became a member of the Society in 1891, died on August 21, 1920. Mr. Vose was born in Providence, R. I., on January 8, 1845. He received his education in the public schools of that city and later attended business college. Mr. Vose was connected for a time with the United States Engineer's Office at Newport, under General G. K. Warren. From there he entered the service of the Standard Oil Co. with whom he remained for about thirty years until his retirement nearly twenty years ago. During his active career he also held the position of superintendent of the Queens County Oil Works and of works manager of the Pratt Manufacturing Co. Later he was with the Standard Oil Co. of New York.

ERNEST HENRY WOOD

Ernest H. Wood, mechanical engineer, Eastern Malleable Iron Co., died on February 24, 1920. Mr. Wood was born on June 10, 1880, in Naugatuck, Conn. He was educated in the schools of Naugatuck and later attended Pratt Institute, from which he was graduated in 1903. Mr. Wood was associated throughout his professional career with the Eastern Malleable Iron Co., being transferred in 1905 from their Naugatuck plant to the works at Wilmington, Del. Mr. Wood's work was in industrial engineering, covering mechanical and electrical design, and the construction and maintenance of industrial plants and equipment connected with the iron and steel industry.

During the War Mr. Wood was appointed Director of Conservation for the Fuel Administration of Delaware. He became a member of the Society in 1913.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and a pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers: non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

RECENT GRADUATE METALLURGICAL ENGINEER for experimental work in copper-teaching laboratory. Location Jersey City, N. J. Z-1708.

MECHANICAL ENGINEER. About 28 to 30 years of age, wanted by manufacturing corporation, for general mechanical layout and installation work. Permanent position. Location, Ohio. Z-1713.

MECHANICAL ENGINEER capable of taking leading part in engineering department as designer-checker for manufacture of general transmission, saw-mill machinery, oil-field rigs, engines, refinery work of growing concern. Good living conditions. Young man desiring permanent location to grow in service and responsibility preferred. State age, training, experience and salary expected. Location Texas. Z-2145.

EXPERIENCED MECHANICAL ENGINEER on operation, maintenance and efficiency of distribution system for gas company located in western Pa. Requires man between 30 and 40 years of age with executive qualifications and experience on distribution lines, gas manufacturing, both water and electric method, and compressing station operation. Reply, stating experience, salary expected and when available. Location Pa. Z-2400.

MECHANICAL ENGINEER with a clientele among consulting engineers and preferably with selling experience in steam appliances such as steam traps, steam separators, exhaust-head and feedwater heaters. Position is with paid Agency. Bureau is not responsible. Location New York City. Z-2419.

SALES ENGINEER. Must be familiar with boilers and power plant. Location Philadelphia District. Z-2421.

DESIGNER for water-tube boilers. Location Philadelphia. Z-2422.

DESIGNERS AND DRAFTSMEN. Opportunity open in progressive plant for several men experienced on design of automatic machines, tools, jigs, and figures for small accurate work such as adding machine, clock and electrical instrument parts. Give references, details of past experience and salary expected in first letter. Location New Jersey. Z-2424.

DRAFTSMEN, three, Mechanical. Thoroughly familiar with shop practice on small interchangeable parts, capable of taking designs and developing them along mass-production lines. State age, full experience, references, and salary expected. Best of working conditions. Location New York City. Z-2450.

TOOL DESIGNER. All around. Familiar with machine operation, jigs, fixtures, gages and particularly punch and die work, blanking, forming and compound for small machinery. First-class opportunity for advancement. State age, full experience, reference and wages expected. Best of working conditions. Location New York City. Z-2451.

PRODUCTION MAN for tractor plant. Must possess initiative and firmness. Write giving references, age, weight, and enclosing recent small photograph. Location Michigan. Z-2453.

TECHNICAL GRADUATES to take students' course in elevator engineering. Work leads to junior executive positions in engineering, construction, sales and service departments. Location, Ohio. Z-2454.

RECENT MECHANICAL ENGINEER, ELECTRICAL ENGINEER, MINING ENGINEER, AND CIVIL ENGINEER for special apprentice course railroad shop work. 1917 graduates considered. Course 3 years with gradual increase in salary during this time. Location Ohio. Z-2455.

INSTRUCTOR in mechanics and steam engineering. Most of his time will be given to department of mechanics, though it is desired that he be qualified to assist in general mechanical laboratory practice and possibly to handle section of elementary heat engines for civil and mining engineers. We could use man who is prepared to teach structural subjects or hydraulics or even sanitary subjects in addition to mechanics. We want a young man who will grow and be worthy of promotion and are more interested in the type of man than in exact type of his professional training. Location West Va. Z-2461.

TIME-STUDY MEN with at least five years' experience on metal parts, the last two in company with well-organized time-study department. Should be able to demonstrate that their studies are correct should occasion so require. Position open after first of year. Location New Jersey. Z-2463.

MAN for boiler and power-house assistant in foreign country. Applicant must be single, not over 35 years of age, healthy and familiar with Edgemoor type of boiler. In applying, state particulars of experience, give references and salary desired. Z-2464.

MECHANICAL SUPERINTENDENT with all-round experience in manufacture of plated hollow-ware for plant in Canada. Experience should include use of white metal and nickel silver, particularly the latter, and such operations as casting, spinning, turning, silver-smithing, soldering, buffing, burnishing, plating, and all kinds of presswork. Z-2469.

MECHANICAL DRAFTSMAN with machine-shop experience to assist in designing cyanide-mill machinery, mine machinery, to lay out and direct cutting of gears and cutters on milling machines, direct machinists in most rapid and economical methods of handling jobbing work on lathes, shapers and drill presses. When not engaged on above work to assist in repair and maintenance of crushing and mining machinery. Board and room at hotel would cost about $45 per month. Most excellent climate, altitude 9000 ft. Location Mexico. Z-2473.

SALESMAN to sell full line of glass bottles. Should be man with actual experience in selling this particular line, and who is willing to travel any territory. Z-2479.

ENGINEER for associate editorship on building publication. Must be familiar with structural and mechanical equipment and have working ability. Giving details of experience. Location New York City. Z-2483.

MECHANICAL ENGINEER DESIGNER for company manufacturing air compressors, hoists, cranes, trolleys, clutch disks, etc. Must be experienced designer in this product. Will be connecting link between purchasing department and shop. Will be responsible for design of manufacturing jigs, fixtures, etc., in consultation with shop and will be responsible for any development work until it is turned over to the shop for manufacture. Location Mo. Z-2485.

INSTRUCTOR in mechanical engineering. Should have reasonable amount of experience. Location China. Z-2489.

PRODUCTION AND TIME-STUDY ENGINEER for company manufacturing calculating machines to work in to position of assistant factory manager. Must have experience in small parts and intricate machinery. Location Newark, N. J. Z-2492.

EXECUTIVE SECRETARY, an attractive opening in Cleveland for technically educated man, 30 to 35 years, preferably one with broad experience in manufacturing business using steel as raw material. Familiarity with cost-accounting, sales, statistics and general administrative features of such business essential. Candidates must possess ability to meet and tactfully deal with business executives, and have ready command of written English. In reply state age, college, year and degree, married or single, specific chronological account of business experience, present and expected salary. Location Boston, Mass. Z-2494.

INSTRUCTOR in drawing descriptive geometry and elementary machine design. Immediate appointment. Good salary. Location Wisconsin. Z-2501.

GRADUATE ENGINEER who has specialized in reduction and regulation of pressure, experienced in power-plant practice, competent as designer with executive ability; by manufacturer of established line of pressure-reducing valves. Excellent opening. Give full experience, references, and salary desired. Location Illinois. Z-2505.

INSTRUCTOR IN APPLIED MECHANICS strength of materials and heat-engines classes and laboratory. Location Md. Z-2514.

TECHNICAL GRADUATES, men about 23 to 25 years of age with small amount of practical experience in industrial or graduate work with some technical college. Six months' training course, and after successful completion of course men are placed in various departments, the engineers in development and research. Location New York City. Z-2515.

PROFESSOR in mechanical engineering. Young man with some experience both in practice and in teaching, and who has already demonstrated his ability. Should be interested in research work and be good organizer and teacher. Location New Jersey. Z-2518.

OPERATING ENGINEER, experienced in steam-pumping plants to take charge of five stations in South. Must have this experience and understand the Prescott steam pump. Location Florida. Z-2525.

ENGINEER-DRAFTSMAN experienced in design of hoisting engines, hydraulic-dredging machinery and similar classes of work, steam and electric; to take charge of drafting-room of manufacturing plant on Pacific Coast. Give experience and salary desired. Z-2527.

INSTRUCTOR in machine-shop practice at large University in Middle West. Should have practical experience in modern manufacturing plants and an understanding of production methods. College training desirable but not required. Age about 28 years. Good opportunity for ambitious young man. Location Illinois. Z-2528.

INSTRUCTOR in forge-shop practice at large University in Middle West. Applicant should understand modern forging practice and heat treatment of steel. Technical training desirable but not required. Age about 28 years. Opportunity for advancement to ambitious young man. Location Illinois. Z-2529.

INDUSTRIAL ENGINEER, graduate with several years' cost-accounting experience, to reorganize production department of pump-manufacturing concern. Someone who has installed cost-accounting systems in factories. Location New York State. Z-2534.

PRODUCTION ENGINEER. Number of young engineers desired who by training, experience and natural inclinations are well fitted to serve as members of high-grade staff management consulting engineers in one or more of various branches of this work. Give full personal record in first letter prior to arranging an interview. Location New York City. Z-2546.

MECHANICAL DESIGNER or M. E. graduate, who can invest working capital and services; can secure half interest in established engineering company, specializing in designing and building automatic machinery. Location Philadelphia, Pa. Z-2547.

REPRESENTATIVE MEN to act as district managers, for company having general offices in Chicago and handling exclusive sales of over 50 heavy sellers, with new lines being added constantly. Quick action on your parts brings full particulars as to territory and lines. Z-2548.

YOUNG MAN for steam-engineering work, also in problems dealing with conservation of fuel in connection with operation of boilers, heating furnaces, etc. State general experience, training and salary expected. Location Pa. Z-2549.

MECHANICAL ENGINEER with textile-machinery experience, familiar with laying out and construction of plant. Selling experience also desirable. Should also have cement and paper-mill experience. Location Shanghai, China. Z-2550.

YOUNG MAN GRADUATE from approved engineering school, with pleasing personality, capable of selling recognized specialties to power-plant engineers. An opening worth full investigation. Give full details. Location Illinois. Z-2553.

CHIEF DRAFTSMAN, with at least five years' experience in tool, jig and fixture designing. Must have executive ability and initiative. Airplane experience desirable, but not essential. Location Ohio. Z-2554.

YOUNG MEN under 30 years of age for test department. Graduates in mechanical engineering of recognized technical college. At least two years' experience in motive-power department of steam railroad. Z-2557.

ASSISTANT EDITOR for engineering journal in New York. Must have good general knowledge of engineering and faculty of writing clean-cut, grammatical English. Preferably one who has prepared articles for publications and who has been a regular reader of technical journals. Location New York City. Z-2560.

PROSPECTIVE INDUSTRIAL ENGINEERS, graduates of Canadian Universities, for manufacturing firm in Eastern Canada. Successful applicants would undergo course of intensive training for period of six months, during which all expenses would be paid. Sound knowledge of industrial and economic principles required. Z-2572.

ENGINEER. Man with technical education, some experience in sales work and capable of developing engineering data into instruction books for non-technical men. Give full particulars of training and experience, age, and salary desired. Location New York City. Z-2577.

ENGINEERS. Openings for one or two technical graduates for development as lubrication engineers. Men with sales or executive experience preferred. Full particulars of training and past experience. State age and salary desired. Location New York City. Z-2578.

GENERAL FOREMAN, high-class, clean-cut; competent for old-established factory, manufacturing parts comparable to high-class automobile work. Give full experience, references, general description of self, recent photo and staring salary. Location, Michigan. Z-2598.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

PRODUCTION EXECUTIVE, at present factory superintendent with 14 years' experience contract-shop, railroad, plant-maintenance, gasoline-motor, motor-car and efficiency engineering; will be available January 1. Will consider part salary and interest in concern of proven merit. Prefer connection in California. SM-5769.

SALES ENGINEER. Age 30; married. Desires connection with high-grade house marketing mechanical goods. Twelve years' practical experience in factory and on road. Would like to travel out of Rochester, taking in Western New York and Pennsylvania. Can meet big men and handle big proposition. Capable of earning $5000. Either salary or commission. SM-5770.

SUPERINTENDENT MARINE ENGINEER. Twenty years' experience machine shop, building, installation, operating and repairs, all types marine engines, turbines and boilers. Chief engineer's license. SM-5771.

MECHANICAL ENGINEER or FACTORY EXECUTIVE. Technical graduate, age 34, desires position with future. Initial salary unimportant if opening is right sort. Long experience, general engineering and management. Two years Captain in army production small arms and ammunition. Three years chargé of laying out and installing equipment at several factories for manufacture of electric cables. Present salary $4500. SM-5772.

MECHANICAL ENGINEER. Technical graduate. Marked executive ability. Successful engineering and sales experience. An engineer who is practical, and a business man. Highest integrity. Captain of Engineers in France. Now employed. Present salary $5000. Desires position with opportunity eventually to acquire interest in manufacturing busniess. SM-5773.

VICE PRESIDENT AND EXECUTIVE. Specialized in industrial relations on large scale; broad experience as mechanical engineer. Works and general manager in chemical and mechanical lines; technical training; desires larger opportunity. Present compensation equivalent to $15,000. Location in or near New York preferred. SM-5774.

MECHANICAL ENGINEER with executive experience desires position as chief or maintenance engineer. Age 27; married. Past experience in steel-mill construction, operating and maintenance; sales experience in boiler and plate work. Salary $4800. Location immaterial. SM-5775.

MECHANICAL ENGINEER. Technical graduate. Age 31, single. Nine years as master mechanic maintenance engineer and mechanical superintendent on large industrial plants, desires connection with industrial concern in any of above or similar capacity. Available immediately. Location preferred West or Southwest. SM-5776.

GENTLEMAN of wide experience as engineer and favorable acquaintance with some of biggest business men of country, wishes to form partnership with man of capital for electrical, mechanical and industrial engineering. SM-5777.

MECHANICAL and ELECTRICAL ENGINEER. Stevens graduate. Married. Five years' experience in power-plant designing, operating, and testing, including 1½ years as engineer officer in Navy, with rank of Lieut. (jg). At present assistant to power engineer of plant in Southwest consisting of 12,000 hp. of turbines and reciprocating engines. Desires position of responsibility, with opportunities for advancement. SM-5779.

INDUSTRIAL ENGINEER. First-class. Knowledge of all phases of planning, production and plant engineering. Desires connection with progressive firm requiring services of man with executive ability and faculty for getting results. Age 30. Location Middle West. Salary $3600. References furnished. SM-5780.

MECHANICAL ENGINEER; 38, married. Technical graduate; 18 years' experience in steam engineering, reciprocating machinery and uniflow engines, as draftsman, designer, consulting engineer and inventor, desires suitable permanent position in steam engineering, research or experimental. Good record and references. Resourceful, energetic and capable of taking charge. East preferred. SM-5781.

FACTORY SUPERINTENDENT and mechanical engineer. Age 34; technical graduate. Has served successfully as machinist, draftsman, plant engineer, mechanical engineer and factory manager. Locomotive, iron and steel foundry, copper and lead smelting, refining and machine-shop management experience. Location immaterial. SM-5782.

YOUNG MECHANICAL ENGINEER. Age 28, married. Desires to make change because of unsettled condition of automotive industries. Ten years' general manufacturing experience as tool and manufacturing engineer; has just completed job in Middle West where he had complete charge of jig and fixture design, operation planning and machine-tool purchases on large new plant recently completed. SM-5784.

GENERAL MANAGER. Mechanical engineer, age 36, constructive type, well-balanced, with broad experience in construction, organization and operation of various large manufacturing plants; with sales training and knowledge of Spanish-American countries, wishes permanent connection with progressive concern in need of executive of character and ability. No objection to foreign service. SM-5785.

FACTORY EXECUTIVE, manager, long experience in organization, production. Broad-gage man. Successful in all positions, also engineering, steam hydraulic, air and gas. Building and construction. Handled factories 3500 men. Will gladly make arrangement for interview and give all details. SM-5786.

ENGINEER and WIDE-AWAKE EXECUTIVE. Age 36. Familiar with solving manufacturing, sales and maintenance problems. Energetic and resourceful organizer and superintendent backed by 15 years' successful experience in general contracting and engineering business in New York City. Would consider representing progressive concern. Unusually fine references. SM-5787.

EXECUTIVE, at present works manager of food factory. Columbia M.E.; Sigma Xi and Amer. Chem. Soc. Thoroughly trained in business and has advanced from position of assistant designer, investigator, testing engineer, superintendent of erection, research engineer, assistant chief inspector. Personal interviews only. SM-5788.

INDUSTRIAL ENGINEER desires executive position with progressive firm; 15 years' engineering experience both in America and abroad. Unusual experience in developing methods of production control and industrial relationship. Thorough knowledge of conditions and business methods in Western Europe. Fluent French, Dutch and fair German. Business training. No objection to location or going abroad. SM-5789.

INDUSTRIAL PHYSICIAN holding degree of M.D. and B.S. from Columbia University, M.E. from Poly. Inst. Brooklyn; age 31, inventor of dental apparatus and appliances. Now engaged as consulting engineer. Only large plant and progressive firm will be considered. Available June 1. SM-5790.

MECHANICAL ENGINEER, M. I. T. Graduate now employed; five years' experience in general plant engineering, maintenance and construction, experimental and development testing of electric motors and works-management investigation. Desires position involving production and management works with industrial concern. SM-5791.

ENGINEER EXECUTIVE. Schooling and experience for five years on steam engines, steam turbines and power-house work. Seven years superintendent of plant making sheet-metal products. Desires position as plant engineer, steam engineer, chief draftsman, or superintendent. Pittsburgh district preferred. Available immediately. SM-5792.

FACTORY EXECUTIVE. Technical education; 10 years' experience on design, production and inspection. Excellent record as executive and organizer as chief draftsman, production engineer and chief inspector. Steam specialties, brass goods and pressed steel. Minimum $3600. Chicago or Middle West. SM-5793.

SALESMAN, experienced tool and alloy steel salesman is seeking connections with high-class steel company to cover Philadelphia and south Jersey. Would consider agency for Scandinavia. Can offer A-1 references from present employer. SM-5794.

MECHANICAL ENGINEER. Age 28, married. Eight years' experience, designing, estimating, industrial valuation, construction and safety work in machine shop, chemical plant and oil refinery; holding position as assistant chief engineer with large corporation. Desires position requiring executive ability. Middle West preferred. Salary $3600. SM-5795.

MECHANICAL ENGINEER, age 36; desires connection in purchasing or sales capacity. Familiar with wide variety of engineering materials. Competent to pass on materials for purchase, prepare specifications, estimates and reports. Location New York City only. At present principal assistant in engineering division. SM-5796.

SALES MANAGER. Graduate mechanical engineer with specialized training in steel-melting, casting and foundry work, rolling, fabricating, and selling; open for engagement January 1. Broad engineering experience developed in connection with sales as well as practical knowledge in planning and laying out new territory sales work and developing force. Executive ability shown as general manager of two-million dollar corporation. Wants opportunity to develop sales on large basis either as sales manager or district manager. SM-5797.

PLANT CONSTRUCTION and maintenance engineer. Technical graduate, age 35. Last ten years, except two as Captain of Engineers, U. S. Army, with present employer on design and construction of industrial plants, railway-locomotive terminals and shops, and general construction. Excellent references, including present employer. SM-5798.

MECHANICAL ENGINEER. Graduate M.I.T. Age 32; married. Experience covers shop course, drafting, designing, calculation of stresses, layout of plant equipment. Proven initiative and resourcefulness in solving of mechanical problems. Desires position as assistant to chief engineer of industrial plant. SM-5799.

GRADUATE '17 mechanical engineering, two years' experience in heating and ventilating and power-plant design. Available immediately. Location preferred Middle West. SM-5800.

SUPERINTENDENT or factory manager desires to connect with alert corporation making so-called difficult product; 17 years' experience in manufacture of machine tools electrical appliances and interchangeable parts. Acquainted with all modern manufacturing methods. Age 37. Desires eastern connection. SM-5801.

GRADUATE MECHANICAL ENGINEER. M.I.T. 1920. Desires position with heating and ventilating firm or power-plant engineers. Want responsible work with chance to show ability. Have had six months' experience in air-duct work. Boston or New York preferred. SM-5802.

COMBUSTION ENGINEER, M.E. graduate with wide range of experience in both theoretical and practical operation of boilers, stokers, oil burners and wood furnaces, in plants from Middle West to Eastern states varying in size from 700 to 56000 rated boiler hp. and contained practically every kind of combustion equipment. Splendid references, best from former employers who know of ability to reduce boiler-room costs. Available immediately. SM-5803.

MEMBER OF MATURE AGE and exceptionally broad education and experience wants position with Eastern manufacturing concern as engineer or Supt. of maintenance, repair and construction in which engineering, organizing and executive ability intelligently applied will justify starting salary of $6000. SM-5804.

PLANT ENGINEER or CONSTRUCTION SUPERINTENDENT, completing installation of large industrial plant desires new connection. Extensive field and board experience in power-plant, power-distribution, gas-producer, and industrial work. Capable of assuming responsibility and of producing results. Salary to start $4800. References furnished. SM-5805.

MECHANICAL and ELECTRICAL ENGINEER with small capital seeks connection with small established concern to take charge of production, maintenance, operation and engineering problems. Location desired Eastern Pa. or New Jersey. SM-5806.

GRADUATE MECHANICAL ENGINEER, age 27, with good personality, desires position as assistant to department head or in sales. Four years' experience heating, power plants, and specialties. Have handled men. References. SM-5807.

MECHANICAL and SALES ENGINEER. Familiar with machinery and equipment builders, desires position as representative for manufacturer of machinery, equipment, or mechanical devices. Present location Chicago. Also acquainted in New York. Experienced in design, construction and testing work. Married. SM-5808.

MECHANICAL ENGINEER and executive, age 29, 10 years' engineering experience covering construction and operation of industrial plants. At present employed as industrial engineer. Not afraid of responsibility. Can handle men, money and materials efficiently. Location immaterial. SM-5809.

MECHANICAL ENGINEER with 15 years' experience. Age 35. Experienced in railroad work and plant engineering. SM-5810.

PRODUCTION MANAGER with 11 years' experience in organizing and managing production, including both fine and heavy work in metals, and chemical process plants. Five years in present position as works manager. Technical graduate; age 35; married. Prefer moderate salary and part of savings. SM-5811.

ASSISTANT PRODUCTION ENGINEER. Technical education; 8 years' experience at production and industrial engineering, planning, estimating and designing. Capable of assuming responsibilities and handling men. Have had successful experience as chief tool designer, head of operation layout and planning department, and assistant production engineer. Vicinity New York. SM-5812.

DEVELOPMENT and PATENT ENGINEER with 10 years' experience in development and patent protection of complicated mechanisms. Practical machine-shop and designing experience. Can take charge of experimental work, make intelligent study of difficult patent situations and suggest means of avoiding existing patents. SM-5813.

WORKS MANAGER or GENERAL SUPERINTENDENT. Technical graduate. Age 47; 22 years' experience in boiler, machine-shop and foundry. Can get production as result of experience not theory. At present employed but desires change. Available immediately. SM-5814.

CERAMIC ENGINEER. Experience in plant and laboratory practice in U. S. and Europe. Competent to take charge of entire plant for production and research work. Open for engagement after January 1921. Excellent credentials. Salary commensurate with scope of work required. SM-5815.

GRADUATE ENGINEER. Age 31; married. Thoroughly familiar with modern manufacturing methods, including production control and costs. Experience covers period of 7 years. SM-5816.

PRODUCTION MANAGER or ASSISTANT TO WORKS MANAGER with 20 years' practical experience in shops and executive positions. Specially qualified to organize and manage production and planning departments both central and shop in plants manufacturing either light or heavy machinery. Age 38. Excellent references. Available immediately. SM-5817.

MECHANICAL ENGINEER, Capt. Ordnance Dept. U.S.A. about to be discharged; 30 years' experience as designing and constructing engineer on cotton mills, power plants, industrial buildings, chemical plants and small arms. Available on drafting board or in the field, either foreign or domestic service. Desires work. SM-5818.

PRODUCTION or PERSONNEL. Engineering graduate. Four years' actual experience; two years as industrial engineer handling reorganizing of both factory and office departments, time study for wage systems, systematizing, cost analysis, and kindred work. Two years as employment manager in charge of employment, medical safety, plant paper, educational, welfare, and industrial relation activities. SM-5819.

WORKS ENGINEER with substantial training and responsible experience open for engagement; 15 years' experience in maintenance, extensive plant improvements, machine installation. Experience covers industrial problems in mechanical and civil work on design, specifications, erection and maintenance. Age 38. Good health. Well posted in accounting, organization control and other features incident to executive experience. Expert in plant improvement and construction. Interested in production work. Salary commensurate with responsibilities. SM-5820.

GRADUATE MECHANICAL ENGINEER. Age 27. Five years' experience tractor engines and motor trucks, in drafting room, shop and field, desires to make change. SM-5821.

MECHANICAL ENGINEER, experienced in design, construction and maintenance of power plants, mills and factories, desires connection in executive capacity with established concern or as organizer in new enterprise of reliable financial backing. Would act as valuation investigator for financial institution; 20 years' experience. Age 46. References furnished. N. Y. and N. J. Metropolitan district preferred. SM-5822.

MECHANICAL INDUSTRIAL PRODUCTION ENGINEER or superintendent; graduate mechanical engineer; age 36; married; 14 years' practical experience. General factory engineering, construction and plant maintenance, designing and building of special improved labor-saving devices. Fixtures and dies for increased production. Broad experience in handling men. SM-5823.

WORKS ENGINEER. Broad experience in design, construction and maintenance of industrial plants, plant layout and installation of equipment. Strong executive capacity and ability to organize and direct operations. SM-5824.

INDUSTRIAL ENGINEER, age 27, married. M.E. degree. Three years' experience in modern factory methods of management; 18 months' in U.S. Army. Thoroughly conversant with time study, efficiency, plant-layout stores and cost-analysis work. Desires postition with industrial engineering firm or with progressive factory. At present employed. Minimum salary $3000. SM-5825.

MECHANICAL ENGINEER, age 31, married; 13 years' practical experience on construction and design of automatic machinery. At present employed as chief engineer of large plant to install engineering department and reorganize machine shop. Location immaterial. Must be possible to get a house. SM-5826.

MECHANICAL ENGINEER and PATENT ATTORNEY. Age 48, with varied experience including machine design, steam engineering and nine years of patent practice. Has inventive and literary ability, talking knowledge of German and Russian and reading knowledge of French. Efficient. SM-5827.

FACTORY SUPERINTENDENT, metal stampings, American, age 37. Twelve years' experience in manufacture of metal stampings. Thoroughly familiar with modern production methods, and close observer of costs. Employed as foreman slitting machinery, foreman power-press department, manufacturing superintendent, and production engineer. Successful in handling labor. SM-5828.

MECHANICAL ENGINEER with 14 years' experience in design, construction and maintenance of power plants and equipment for industrial buildings and similar work. SM-5829.

EXECUTIVE or assistant to executive. Technical mechanical graduate, age 28; 8 years' experience general manufacturing, textile, machine shop, brass and ferrous, maintenance, design, organization, and administration. Good correspondent and capable of assuming responsibility. SM-5830.

ASSISTANT WORKS MANAGER or efficiency engineer in chemical plant, age 25; graduate in mechanical engineering. Married. Six years' experience in design, operation, maintenance and economy of chemical-plant equipment, such as filters, dryers, evaporators, etc., in various operations. At present employed by large chemical concern as specialist on chemical plant processes and equipment. Salary $4000. SM-5831.

MECHANICAL ENGINEER, graduate M.I.T. '03, age 39, married. Unbroken experience in general engineering, both designing and supervision, power plants and mechanical equipment. Available immediately. SM-5832.

MECHANICAL ENGINEER. Stevens graduate, desired position with consulting engineer or power-plant specialist; 12 years' experience in power-plant operation and design including erection supervision. Particularly experienced in design, erection, application and operation of pulverized-fuel installations. Philadelphia or vicinity preferred. SM-5833.

MECHANICAL ENGINEER, M.I.T. graduate. Three years' experience, one year officer in Army Air Service. Desires position of responsibility as engineering or industrial executive or assistant executive. Experience in power-plant and machine-tool layout, construction, purchasing and factory maintenance work. Good knowledge of electrical and steam distribution and transmission. Available at once. SM-5834.

GRADUATE MECHANICAL ENGINEER, age 26, desires position involving technical calculations and abundant engineering experience. Responsible position preferred. Has 6 years' experience in shop, designing, developing and testing and good theoretical knowledge of thermodynamics. Would like to connect with concern where personal efficiency is appreciated and chance of advancement good. Salary $2700. SM-5835.

PRODUCTION or SALES MANAGER. American, age 49. Technical and practical shop training, covering tool making, tools and jig designing; superintendent of production; selling; plant engineer and manager. Special attention to plant layout, correct tools and equipment, proper organization to produce accurately and rapidly. SM-5836.

SAFETY ENGINEER, technical graduate. Chief engineers' certificate; 19 years' shop and practical engineering experience; 4 years' field engineer on engine, boiler and factory-safety welfare. Anywhere U.S.A. or abroad. Minimum salary $5000. SM-5837.

PULVERIZED FUEL ENGINEER with 8 years' successful experience at home and abroad, in charge of design, construction, and operation of complete pulverized fuel plants for metallurgical and steam-raising work as well as wide metallurgical-furnace experience, desires connection with reliable engineering firm. SM-5838.

MECHANICAL ENGINEER, age 28; technical graduate. Varied experience in design of chemical plants and steam plants; also field-estimating and purchasing experience; desires position with industrial concern. SM-5839.

ENGINEERING or PRODUCTION EXECUTIVE, graduate mechanical engineer at Case. Age 36, married; 13 years' experience in construction work, plant layout, inspection and mechanical designing. Has held position as foreman of inspection, chief draftsman, assistant chief engineer, consulting and construction engineer. Desires responsible position preferably along commercial lines with possibility of organizing departments and obtaining results. Location no object, but opportunity to acquire interest in business as results warrant. Minimum salary $5000. SM-5840.

ELECTRICAL MECHANICAL ENGINEER, age 27, single. Four years' experience in general plant engineering; wishes position along lines of research or production; good references. SM-5841.

PLANT ENGINEER, ex-Naval officer. Seven years' varied experience, shop, erecting, designing and operating. Hold both chief-marine and first-class stationary licenses. Desire position as plant engineer or assistant in large industrial concern. Minimum salary to start, $3500. SM-5842.

MECHANICAL ENGINEER, experienced in design and construction of marine machinery, power plants, refrigeration and heating apparatus, wants permanent position with firm of consulting engineer or others engaged in this class of work. At present employed, but change is necessary. SM-5843.

MECHANICAL ENGINEER, technical graduate, age 26. Varied shop and business experience. At present employed by Public Utilities Commission as mechanical engineer. Desires position with manufacturing or industrial engineering concern. Present salary $240 per month. SM-5844.

INDUSTRIAL ENGINEER. System man whose several years of experience in installing and operating modern production and accounting methods is based on practical experience in various factory "jobs" and "positions." At present employed as Assistant to president of large manufacturing concern in charge of all matters of system and routine. Technical graduate. Age 38. SM-5845.

PLANT ENGINEER or MECHANICAL ENGINEER, age 28, American, single. M.E. degree. Experience in maintenance, repair, general-plant construction, plant layout in large manufacturing plant. Will gladly furnish detail of experience. Desires permanent location. SM-5846.

MECHANICAL ENGINEER, technical graduate, age 28, married. Executive experience as purchasing engineer for export. Also purchasing and erecting experience in oil-refinery and design of sugar machinery, wishes connection preferably vicinity of New York City. Available immediately. SM-5847.

MECHANICAL ENGINEER, Columbia graduate, age 28, desires position where broad experience, business training and executive ability can be util-

ized. Experience includes construction and operating work, and covers all departments of large electric light and power company. SM-5848.

MECHANICAL ENGINEER, age 38. Twenty years' broad engineering experience in design of mill, hydraulic, and special machinery, automobiles, marine and aero gasoline engines and air compressors, factory engineering and maintenance, reports, specifications and estimates. Capable of handling men. At present employed as chief engineer. Would consider any location, but prefer Cleveland district. SM-5849.

MECHANICAL ENGINEER, with eleven years' experience in paper mills; steel-sash and auto springs and industrial-trailer manufacturing. Two years as draftsman and designer on machinery, power-plant and factory-equipment layout and buildings; seven years in executive capacity as assistant to chief engineer; works engineer and superintendent of production. Good organizer and executive. Technical graduate. Age 34, married. Available immediately. SM-5850.

GRADUATE MECHANICAL ENGINEER, age 31, married; three years instructor in mech. engineering; two years' experimental and development work in Engineering Division, Ordnance Dept. U.S. Army. One year works manager, two years' selling experience. Employed at present. Desires to connect with reliable concern in sales of engineering. SM-5851.

WORKS MANAGER, Stevens Graduate. Preferably metal-working line located near New York. Have had considerable experience in manufacture of pyroxylin plastics; 16 years' experience in plant maintenance and manufacturing production methods. SM-5852.

MECHANICAL ENGINEER, chief engineer, master mechanic. Technical graduate; 12 years' experience. Thorough mechanic, capable of taking complete charge of mechanical department with necessary engineering and construction. Specialist in combustion and power-plant development as furnace and fuel engineer. Excellent man for consulting engineer. Location preferred New York City. SM-5853.

ENGINEER, EXECUTIVE, 35, married, M.E. Stevens Tech.; wide experience; plant layout, machine design, construction and plant engineer; (including shell production), 2 years' in field on railroad and water-power development, 2 years' instructing in M.E. and Naval Construction in classrooms, drafting rooms and shops. Salary $4000. East preferred. SM-5854.

STEVENS GRADUATE, 1914; general conditions have seriously affected company by which employed. Experience: railroad traffic and operation, mill construction, maintenance and production; army flying-field construction; directing making of war-contract cancellation reports; selling construction and industrial material handling equipment. SM-5855.

MECHANICAL ENGINEER, technical graduate, age 35, wishes executive engineering position in connection with design, experimental, construction, maintenance work, or operation. SM-5856.

ENGINEER, Stevens Graduate, 30 years old, married. Technical and executive experience with large corporation in U.S.A., India and France in oil industry, machinery, food products and metal lines. Would like to connect with oil industry in production end, or with management corporation. SM-5857.

SALES OR PURCHASING EXECUTIVE. Age 31, married. Extensive sales engineering and purchasing experience in steel and special machinery business. Have managed successfully branch office. Wide acquaintance in East. Present salary $8000. Excellent reference. SM-5858.

MECHANICAL ENGINEER, power plant, factory and foundry designer; also superintendent of construction. Designer of mechanical handling of material and special machines, designer of heating systems, and furnaces; maintenance and operating engineer. Have held important positions with large engineering company for past 19 years. SM-5859.

ENGINEER, technical graduate, age 31. Experience in design of water-supply project for large city, tunnel construction, some structural work; for 2½ years' in various capacities, intimately connected with production, in large automobile and aero-engine plant. Have worked abroad and would consider position there. SM-5860.

GRADUATE MECHANICAL ENGINEER, native of New York, experienced manager of leading American corporations manufacturing mechanical and electrical equipment, desires connection, preferably representing important industrial concern in Eastern territory or for export. Successful selling record here and abroad; wide acquaintance in engineering and business circles; good organizer; highest credentials. SM-5861.

MECHANICAL ENGINEER, age 26, Stevens graduate; 2½ years' experience as assistant to plant engineer in design, maintenance, factory power-plant improvement, combustion and fuel-oil work, boiler testing, etc. Desires position with reliable industrial concern as assistant to plant engineer. SM-5862.

MECHANICAL ENGINEER, Columbia graduate 1913. U.S. Navy—engineering ensign during World War; 30 years of age, single, American, versatile and willing to study law or accounting for opportunity where either might be of value in engineering practice. Fair draftsman and machinist in power-house auxiliaries and printing-press manufacture. Limited sales experience in the above. Salary not first consideration. Temporarily employed at present. SM-5863.

ENGINEER of broad training along general lines including production, industrial, plant and field, covering mechanical, electrical, chemical and structural engineering, economics, appraisal and cost. Just released from Army. SM-5864.

MECHANICAL ENGINEER, executive, good organizer, age 35, over 15 years' experience. Several years chief draftsman. Broad experience including all classes railway equipment, shop tools and machinery, dredging, marine, and construction equipment. Satisfactorily filled positions. Last 10 years of executive nature both along engineering lines and others. SM-5865.

MECHANICAL ENGINEER, age 29, technical graduate. Nine years' experience, experimental, research, development, shop work, machine and tool design in small interchangeable parts. At present instructor in apprentice school, shop work and drawing. West preferred. SM-5866.

FACTORY SUPERINTENDENT, age 29. University graduate. Has worked up through ranks serving successfully as machinist, foreman, designer, plant engineer, assistant factory superintendent. Can handle labor. Speaks several languages. Desires to affiliate with medium-size concern in Middle West. SM-5867.

CONSULTING ENGINEER on electric railways, electric-light plants, water powers, manufacturing plants, design, specifications, supervision. Valuations, appraisal, investigations and reports on earning power of existing properties, and predeterminations relative to proposed enterprises. General manager and sales engineer for public utilities and manufacturing. SM-5868.

YOUNG MECHANICAL ENGINEER desires connection with firm for foreign service. Excellent references. SM-5869.

COMBUSTION ENGINEER. Thoroughly familiar with all systems of automatic-combustion control, now on market. Specializing in fundamentals of combustion control from engineering standpoint. Doing original work along this line. Executive and sales ability. Age 38. SM-5870.

MECHANICAL ENGINEER, age 28, married, no children; 8½ years of shop practice, tool designing, safety and equipment engineering, plant layout, plant and manufacturing equipment, maintenance. Boiler-room tests and efficiency records of same. Can efficiently handle men. Salary $3600 to $4000. Location anywhere in the U.S.A. SM-5871.

INDUSTRIAL ENGINEER, technical graduate, age 34, desires position as assistant general manager or assistant to chief operating official of large industrial plant with chance for advancement. Employed as industrial engineer and superintendent by large Eastern manufacturing corporation. Available immediately. Have had broad experience in purchasing of materials, employment of labor, design and layout of factories, installation of scientific production methods and supervision and operation of industrial plants. SM-5872.

MECHANICAL ENGINEER, with 17 years' experience in operating power plants, new construction, and design of new equipment layouts, desires position with large manufacturing plant, or public utility, age 35, married. Salary $3600. SM-5873.

TOOL DESIGNER, wide experience on jigs, fixtures and gages. Prefer New York City but would go anywhere. Minimum salary $45. SM-5874.

GRADUATE ENGINEER, five years' experience as mechanical and structural draftsman. American, age 24, single. $200 month. SM-5875.

CHIEF ENGINEER with modern steel work, 25 years' experience in engineering wishes position with engineering concern. SM-5876.

MECHANICAL ENGINEER, technical graduate, age 31, single, American. At present U.S.A. officer (Ordnance Department). Special experience: scientific research or experimental work; also sociological work. Seeks position as welfare manager or head of experimental department of works. Speaks French fluently. SM-5877.

HIGHLY TRAINED MECHANICAL EXECUTIVE desires position requiring broad-gage man; 20 years' manufacturing experience, acquired as tool-room foreman, general supervisor of equipment, general superintendent, works manager, assistant general manager, and general manager; successful record as executive. Familiar and in sympathy with best shop methods. Will gladly furnish detail of experience with references. SM-5878.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JAN. 13, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 257.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Jan. 13, 1921, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

BENZIGER, JAKE U., Plant Superintendent, Alabama Power Co., Birmingham
MITCHELL, WILLIAM E., Assistant General Manager, Alabama Power Co., Birmingham

Arkansas

SICKEL, H. B. ALLEN, Manager, Arkansas Division, Layne & Bowler Co., Stuttgart

California

BURNETTE, WALTER W. H., Montebello Oil Co., Fillmore
DAY, DONALD W., Chief Draftsman, Bethlehem Shipbuilding Corpn., Ltd., San Francisco
KNAPP, ROBERT T., Draftsman, C. M. Gay & Son, Los Angeles
PARKER, BRAMAN C., Chief Engineer, Alexandria Hotel, Los Angeles
THOMSON, THOMAS S., Supervising Engineer, Ambassador Hotel System, Los Angeles
THOMSON, WILLIAM E., Steam Plant Engineer, Southern California Edison Co., Los Angeles

Colorado

GARDNER, CLYDE, Chief Draftsman, The Baker Steam Motor Car & Manufacturing Co., Pueblo, Re-Election

Connecticut

BRODHEAD, JOHN A., Director of Education, New Haven Y. M. C. A., New Haven

CARTWRIGHT, RALPH A., Fire Prevention Engineer, Hartford Fire Insurance Co., Hartford
COYLE, JOHN H., Billings & Spencer Co., Hartford
DAVIS, JOHN, Machine Designer, Hartford-Fairmont Co., Hartford
GERMAN, ABRAHAM J., Chief Engineer, Scovill Manufacturing Co., Waterbury
HOLCOMBE, HENRY W., Machinist, New London Ship & Engine Co., Groton
JANKURA, MICHAEL, JR., Tool Designer, General Electric Co., Bridgeport
NORTHEND, ALLAN P., Installation Engineer, Hartford Fairmont Co., Hartford
OLIND, JOHN H., Instructor, Machine Shop, State Trade School, Meriden
PURVIN, BENJAMIN S., Chief Designer, The Bilton Machine Tool Co., Bridgeport
RIGS, ANDREW J., Jigs & Fixture Designer, Hartford Fairmont Co., Hartford
ROWELL, RALPH K., Vice-President, Hubbard, Harris & Rowell, Inc., Bridgeport
VISSER, A. J. PRINS, Mechanical Engineer, Billings & Spencer Co., Hartford
WATROUS, I. ALLEN, Manager, Watrous Engineering Co., Bridgeport
WEAVER, EDWARD C., Master Mechanic, H. P. & E. Day Co., Seymour
WEST, FRANK R., Industrial Engineer, Yale & Towne Manufacturing Co., Stamford

Delaware

DOWLING, NORTH, JR., Mechanical Engineer, Eastern Malleable Iron Co., Wilmington

District of Columbia

LEIGHTON, MARSHALL O., Member, M. O. Leighton & Co., Washington
ROESER, HARRY M., Associate Engineer Physicist, Bureau of Standards, Washington

Georgia

ADAMS, SAMUEL T., Efficiency Engineer Understudy, Fulton Bag & Cotton Mills, Atlanta
DEUEL, HARRY A., Chief Engineer, Atlantic Steel Co., Atlanta
FRANCIS, WILLIAM M., Manager, Atlanta Department, Hartford Steam Boiler Inspection & Insurance Co., Atlanta
WARD, SAMUEL E., Superintendent, Steam Division, Westinghouse Electric & Manufacturing Co., Atlanta

Illinois

CHURCHILL, FRANK A., Engineer in Charge of Labor Problems, Haynes Corpn., Chicago
LEACH, HAL W., Designer, Illinois Steel Co., Joliet
PAVEY, WILLIAM B., Treasurer, Economy Engineering Co., Chicago
RADEBAUGH, GUSTAV H., Assistant Professor, University of Illinois, Urbana
SCHALLER, GILBERT S., Factory Manager, H. D. Conkey & Co., Mendota
SCHWEIKERT, JOHN N., Industrial Engineer, L. V. Estes, Inc., Chicago
SEVENSEN, BARNEY G., Chief Draftsman, International Register Co., Chicago
SHAKMAN, JAMES G., Sales Engineer, International Filter Co., Chicago

Indiana

GRIFFITH, C. P., Assistant to General Sales Manager, S. F. Bowser & Co., Inc., Fort Wayne
OSLER, H. FRANK, Production Manager, Imperial Drop Forge Co., Indianapolis

Iowa

HUMMEL, JESSE G., Associate Professor, Mechanical Engineering, Iowa State College, Ames
NORMAN, ROY A., Associate Professor of Mechanical Engineering, Iowa State College, Ames

Maryland

DIDOMENICO, ANTHONY F., Draftsman, Baltimore County Water & Electric Co., Baltimore
HILDEBRAND, JOSEPH G., Southern Supply Co., Baltimore

Massachusetts

RODGERS, HENRY P., Instructor in Engineering, Baltimore Polytechnic Institute, Baltimore
BOWEN, CLARENCE A., Consulting Engineer, John A. Stevens, Lowell
CONRAD, CHARLES W., Plant Engineer, Bird & Son, East Walpole
CROCKER, HAROLD W., Engineer, Walworth-English Flett Co., Boston
ELL, CARL S., Dean Co-Operative School of Engineering, Northeastern College, Boston
FOGG, HARRY H., Designing Engineer, Boston Elevated Railway, Boston
GILES, WALTER C., Erecting Engineer, Westinghouse Electric & Manufacturing Co., Boston
GLYNN, ALFRED T., Engineer, Sturtevant Mill Co., Boston
GREENLEAF, CUTHBERT T., Checker, Stone & Webster, Inc., Boston
HEATLEY, FREDERICK, Cost Engineer, New York, New Haven & Hartford Railroad, Readville
HILL, CHARLES F., Chief Engineer, W. F. Schrafft & Sons Corpn., Boston
HORIGAN, JOHN H., Superintendent of Factory Orders, Union Twist Drill Co., Athol
JEFFERY, EDWARD A., Student Engineer, Worthington Pump & Machinery Corpn., E. Cambridge
JONES, ALONZO L., JR., Student Sales Engineer, Worthington Pump & Machinery Corpn., Holyoke
KLEINSCHMIDT, ROBERT V., Harvard Engineering School, Cambridge
McCARTY, JAMES E., Stone & Webster, Inc., Boston
McNEAR, GEORGE R., The Hendey Machine Co., Boston
MOLLER, KENNETH, District Manager, Lockwood, Greene & Co., Boston
NANGLE, CHARLES J., Worthington Pump & Machinery Corpn., E. Cambridge
PACK, EUGENE F., Assistant Production Manager, Blake & Knowles, Cambridge
PARKER, FRANK E., Engineer, Underwood Machinery Co., S. Boston
RUBIN, DAVID N., Draftsman, Stone & Webster, Boston
SELLER, J. TENNYSON, Vice-President, Velco Manufacturing Co., Inc., Greenfield
STOKES, FREDERICK M., Service Engineer, Westinghouse Electric & Manufacturing Co., Boston
THOMPSON, CLIFFORD F., Student Engineer, Worthington Pump & Machinery Corpn., East Cambridge
TUFTS, WILLIAM, Textile Engineer, Lockwood, Greene & Co., Boston
VANHOOK, CHARLES F., Assistant Inspector of Ordnance, United States Navy, Quincy
WALTON, EARLE, Steam Turbine Erecting Engineer, Westinghouse Electric & Manufacturing Co., Boston
WENTWORTH, HARRY A., Chief Engineer, Bird & Son, Inc., East Walpole

Michigan

OXFORD, CARL J., Chief Engineer, National Twist Drill & Tool Co., Detroit
QUICK, GLEN W., Chief Engineer, Lansing Stamping Co., Lansing
WILLIAMS, GARDNER S., Consulting Engineer, Gardner S. Williams, Ann Arbor

Minnesota

GUGGISBERG, CHARLES F., Draftsman, Minneapolis, St. Paul & Saulte Ste Marie Railroad, Minneapolis

Missouri

GLEN, HUGH, Master Mechanic, Union Electric Light & Power Co., St. Louis
RENNIE, JOHN A., Consulting Engineer, M.K. & T. Railroad, St. Louis
ROSBOROUGH, JAMES G., JR., Mechanical Engineer, St. Louis Screw Co., St. Louis

New Jersey

BENNEY, WILLIAM A., Superintendent, Laboratory of Thomas A. Edison, West Orange
CHARLES, HENRY E., Chief Engineer, Gillespie Eden Corpn., Paterson
CLARK, PHILIP C., Assistant to Chief Engineer, Garfield Worsted Mills, Garfield
GALLAGHER, DAVID, Assistant Superintendent, Seabord By-Product Coke Co., Jersey City
GREINER, ARNO, Designer, Singer Manufacturing Co., Elizabethport
HEGARTY, WILLIAM, Assistant Managing Engineer, Hoist Department, Sprague Electric Co., Bloomfield
HENCH, WILLIAM M., Construction Mechanical Engineer, Federal Shipbuilding Co., Kearney
HUBBINETTE, CARL W., Mechanical Engineer, A.B. See Electric Elevator Co., Jersey City
KUEHN, RAYMOND L., Tool Designer, International Motor Co., New Brunswick
KURTZE, NEWTON R., Assistant Engineer, Thomas A. Edison, Inc., W. Orange
McCLURE, SAMUEL S., Superintendent, Collar & Cuff Department, The Celluloid Co., of America, Newark
PEEHL, CARL F., Assistant to Master Mechanic, The United States Aluminum Co., Edgewater
ROEHM, HENRY H. A., Tool Designer, Gould & Eberhardt, Irvington
SCHERER, FRANK J., Mechanical Draftsman, The Celluloid Co., Newark
STIRLING, NORMAN W., Manager, Stirling Machine Works, Jersey City
STRATTON, ALBERT C., Engineer, Richardson Scale Co., Passaic
TAYLOR, ALBERT H., Engineer, Ingersoll-Rand Co., Phillipsburg
WATSON, CLAUDE C., General Engineer, Standard Oil Co., Elizabeth
WEATON, GEORGE F., Power Plant Engineer, Thomas A. Edison, Inc., East Orange

New York

ARMSTRONG, CHARLES H., Alberger Chemical Machinery Co., New York
BACHMANN, ALWIN B., in charge of Drafting Room, Keller Mechanical Engraving Co., Brooklyn
BEANS, WALTER H., Experimental Engineer, Keller Mechanical Engraving Co., Brooklyn
BENKLIDES, GABRIEL N., Sales Engineer, Export Department, Shipley Construction & Supply Co., Brooklyn
BEZANSON, CLAUDE E., Mechanical Engineer, Skelton Tool Co., Syracuse
BRIDGWATER, HERBERT E., Chief Engineer, Remington Typewriter Co., Syracuse
BRYANT, FREDERICK C., Treasurer & Manager, Alliance Transportation Co., Inc., New York
CAMDEN, ALEXANDER T., Technical Department, Vacuum Oil Co., New York
CAMMARATE, FRANK, Draftsman, The New York Edison Co., New York
CARPLES, VICTOR H., Secretary & Treasurer, L. J. Wing Manufacturing Co., New York
CARTER, WILLIAM P., General Electric Co., New York
CHAPMAN, WILLIAM H., District Turbine Inspector, General Electric Co., New York
CHAVE, WALTER E., President, McQuillen & Chave, Inc., New York
COLIN, LEON N. W., Designer of Metal Airplanes, United States Air Service, New York
COLLINS, JOHN, JR., Assistant Power Engineer, The American Sugar Refining Co., New York
CROCKETT, WINTHROP M., Mechanical Engineer, Alberger Pump & Condenser Co., New York
CURTIS, PHILIP N., Vice-President, Bateman & Companies, Inc., New York
DEMPSEY, HARRY P., Mechanical Engineer, Associates Buffalo Architects, Buffalo
DUNLAP, EDGAR F., Engineering Department, Ocean Accident & Guarantee Corpn., New York
FERRIER, CHARLES C., Brooklyn
FERRIS, JOHN T., Industrial Engineer, L. C. Smith & Brothers Typewriter Co., Syracuse
FREMONT, ELMER G., Secretary, The Emerson Engineers, New York
GAVETT, JOSEPH W., JR., Assistant Professor, Cornell University, Ithaca
GERKEN, EDWARD R., Instructor, Pratt Institute, Brooklyn
HARDIN, FRANK H., Chief Engineer of Motive Power & Rolling Stock, New York Central Railroad, New York
HARSEN, OTIS Y., Assistant Engineer, New York Central Railroad, New York
HESCOCK, ETHAN N., Vice-President & General Manager, New Jersey Foundry & Machine Co., New York
HILL, FRED C., Engineering Assistant, Syracuse Lighting Co., Syracuse
HOLMES, WILLIAM C., Turbine Specialist, General Electric Co., New York
HOUSTON, GRAY J., Engineering Staff, Henry L. Doherty & Co., New York
HOWES, ROBERT V., Assistant Superintendent, Hotel & Restaurant Domestic & Industrial Department, Consolidated Gas Co., New York
HUTCHINSON, ADELBERT A., Manager, Atlanta Office, Combustion Engineering Corpn., New York
JONES, LESTER M., Engineer Designer, Improved Equipment Co., New York
KALTWASSER, CARL M., Treasurer & Ceneral Manager, Salisbury Axle Co., Jamestown
KANTROWITZ, MELVILLE W., in charge of Die Department, Keller Mechanical Engraving Co., Brooklyn
KERR, EDWARD A. N., Inspection Engineer, Robert W. Hunt & Co., New York
LAPPIN, JOSEPH, Testing Engineer, Combustion Engineering Corpn., New York
LEFFINGWELL, WILLIAM H., President, The Leffingwell Ream Co., New York
MASSIMI, JOHN J., Student Engineer, General Electric Co., Schenectady
MILLER, LOUIS, Layout Man, E. W. Bliss Co., Brooklyn
MOHLER, DAVID D., Draughtsman, Solvay Process Co., Syracuse
MONTGOMERY, ORA C., Engineer Assistant to Superintendent of Power, New York Central Railroad, New York
MOORE, CLAYTON H., Mechanical Engineer, Dodge Sales & Engineering Co., New York
MOORE, H. CLAY, Southern Manager, Green Fuel Economizer Co., New York

MOSHER, Clarence H., Superintendent, Maintenance & Construction, Newburgh Shipyards, Inc., Newburgh
MUNIER, Leon L., Wolff & Munier, Inc., New York
NEWMAN, Ernest W., Manager, Kieley & Mueller, Inc., New York
OSEAN, Charles, Factory Superintendent, American Ever Ready Works, Long Island City
PANERO, Guy B., Chief Draftsman, Standard Textile Products Co., New York
PARSONS, Charles J., Sales Engineer, Celite Products Co., New York
RITCHIE, Charles W., Chief Designer, Peirce Accounting Machine Co., New York
ROBERTS, Ralph T., Draftsman, New York Edison Co., New York
ROSEN, Theodore, New York Steam Co., New York
SADLER, Robert A., Steam Tester, Brooklyn Rapid Transit Co., Brooklyn
SANDO, Francis B., Draftsman, Republic Engineers, Inc., New York
SANWALD, Carl H., Engineer, Oil Engine Department, De La Vergne Machine Co., New York
SCHMIDT, Albert G., Sales Engineer, Shepard Electric Crane & Hoist Co., Montour Falls
SCHMIDT, Louis, New York
SCHWARTZ, Edward H., Designer & Assistant Engineer, Richmond Radiator Co., New York
SERGEANT, Charles H., Engineer, United States & Cuban Allied Works Engineering Corpn., New York (Reinstatement)
SETCHELL, John E., Instructor, Brooklyn Polytechnic Institute, Brooklyn (Re-election)
SHATANOFF, Robert, Assistant Superintendent, Eastern Tube & Tool Co., inc., Brooklyn
SIMPSON, John, Assistant Superintendent & Engineer, Munson Steamship Line, New York
SPITZFADDEN, Alfred E., Assistant Leading Mechanical Draftsman, New York Edison Co., New York
STANGOS, Constantine N., Steam Tester, Williamsburg Station, Brooklyn Rapid Transit, Brooklyn
STEINICKE, Frank H., Sales Engineer, Foamite Firefoam Co., New York
STEPHAN, Alexander, Technical Attache to the Czechoslovak Consulate General, New York
STULL, Eugene S., Jr., Chief Engineer, R. H. Comey Co., Brooklyn
TICKELL, Stanley M., Maintenance Machinist & Engineer, Singer Sewing Machine Co., New York
TIGER, Howard L., The Permutit Co., New York
WAHLSTROM, Oscar, Draftsman, The Foundation Co., New York
WEST, Perry, Executive Engineer & Secretary, Anti-Corrosion Engine Co., Inc., New York
WHITE, Elwood S., President & Treasurer, Thermal Appliance Co., New York
WILHELM, Frederick, Foreman, Keller Mechanical Engraving Co., Brooklyn
WINDER, Frank J., Gas Engineer, The Surface Combustion Co., Bronx
WOLLE, George H., Developing Benner Gas & By-Product System, New York

Ohio

COLLINS, Fred T., Mechanical Engineer, Worthington Pump & Machinery Corpn., Cincinnati
COWAN, Bohart, Mechanical Engineer, Worthington Pump & Machinery Corpn., Cincinnati
DEARBORN, Elbert R., Sales & Service Engineer, Bailey Meter Co., Cleveland
PIEBES, Charles H., Junior Salesman, The White Co., Cleveland
WALLACE, Edward, Chief Checker, The Glenn L. Martin Co., Cleveland

Oklahoma

SULLIVAN, William L. Conducting Machinery Business. Tulsa

Pennsylvania

BALTZLY, Clifford C., Engineering Assistant, The Philadelphia Electric Co., Philadelphia
BINNS, Arthur W., Assistant Chief Engineer, Boiler House Power Department, Atlantic Refining Co., Philadelphia
BLOSS, Leonard C. M., Test Engineer, Carnegie Steel Co., Duquesne
BROWN, Albert K., Engineer, The Globe Automatic Sprinkler Co., Philadelphia
BUCKLEY, Daniel J., Handyman in Boiler Room, Eliza Furnace, Jones & Laughlin Steel Co., Pittsburgh
BURPEE, Chandler, E. G. Budd Manufacturing Co., Philadelphia
CROSBY, George W., Reinforce Steel Foreman, D. P. Robinson & Co., Inc., Seward
DEAN, William Edward, Jr., Assistant Engineer of Tests, Westinghouse Air Brake Co., Wilmerding
HEFBURN, Peter W., Production Engineer, R. D. Nuttall, Pittsburgh
HOUGHTEN, Ferry C., Heating Engineer, Research Bureau, American Society of Heating and Ventilating Engineers, Pittsburgh
HUNT, James E., Plant Superintendent, Philadelphia Electric Co., Philadelphia
JOOS, Charles E., Chemical Engineer, Atlantic Refining Co., Philadelphia
KIDDER, Elmer, Westinghouse Electric & Manufacturing Co., Pittsburgh
KLEIN, Louis W., Works Manager, Coxe Traveling Grate Co., Port Carbon
KRADOLFER, Alfred, Mechanical Engineer, Carpenter Steel Co., Reading
MacGREGOR, Walter J., Lubricating Engineer, Atlantic Refining Co., Philadelphia
MONTAGUE, Joseph F., Sales Manager, John Wood Manufacturing Co., Consohocken
NEWMAN, Joseph Jr., Assistant to Shop Superintendent, Hull Division, League Island Navy Yard, Philadelphia
PEARCE, Lester F., Designing Draftsman, A. C. Weed, Consulting Engineer, Philadelphia
RHEINFELDT, John T. B., Supervisor of Standards, Sheldon Axle and Spring Co., Wilkes-Barre
RINEHART, Evan, Sales-Engineer, Oil Industry Department, Johns-Manville, Inc., Philadelphia
RISLEY, Walter J., Jr., Research Engineer, H. S. B. W. Cochrane Corpn., Philadelphia
SCHMIDT, Carl W., Chief Draftsman, B. F. Sturtevant Co., Philadelphia
SCHOFIELD, Harold E., Instructor, University of Pennsylvania, Philadelphia
SEE, Theodore S., Assistant General Superintendent, Jones & Laughlin Steel Co., South Side Pittsburgh
SOLOT, Benjamin H., Cost Engineer, Day & Zimmermann, Inc., Philadelphia
SOLT, Stanley O., Assistant in Engineering and Estimating Department, Bethlehem Foundry & Machine Co., Bethlehem
TAYLOR, Jesse, Jr., Engineer, Westinghouse Electric and Manufacturing Co., Philadelphia
WILSON, Alexander, 3rd Special Assistant to Chief Engineer, The Philadelphia Electric Co., Philadelphia

South Carolina

ROSE, Alexander, Mechanical Engineer, J. E. Sirrine & Co., Greenville
SIRRINE, Joseph E., Executive Head, J. E. Sirrine & Co., Greenville

Texas

HOPPE, Roland C., Assistant Machine Shop Foreman, The Texas Co., Port Arthur

Vermont

HASKELL, William E., Superintendent, Pipe Organ Department, Estey Organ Co., Brattleboro

Washington

HOUGH, Ulysses B., Spokane
TODD, John N., Mechanical Engineer, Colby Steel & Engineering Co., Seattle

West Virginia

PEASLEE, Willis D. A., Acting General Manager, Jeffery-Dewitt Insulator Co., Huntington

Wisconsin

BENEDICT, Charles H., Assistant to President, The Vollrath Co., Sheboygan
BURNISH, Howard J., Chief Engineer, Gas Engine Works, Worthington Pump & Machinery Corpn., Cudahy
GAUM, Albert F., Kearney & Trecker Co., Milwaukee
RUTH, James E., Sales Representative, Gisholt Machine Co., Madison

Canada

BRADLEY, James H., Chairman, Disabled Soldiers Training Board, Toronto, Ont.
BURGESS, Kenneth A., Plant Engineer, Canadian Kodak Co., Ltd., West Toronto, Ont.
CASSELDEN, Albert, Draftsman, Canadian General Electric Co., Lamp Base Works, Toronto, Ont.
GOUGEON, Elzear, Mechanical Draftsman, Dominion Glass Co., Pointe St. Charles, Que.

China

KNOTT, Henderson W., Manager, Gaston Williams & Wigmore, Far East Division, Shanghai

Cuba

SOPER, Robert H., Turbo Erecting Engineer, General Electric Company of Cuba, Havana

England

BROWNLIE, David, Manager and Director, Brownlie and Green, Ltd., London E. C. 2
ROBINSON, Isaac V., Staff Engineer, British Electrical and Allied Manufacturers' Association, London W. C. 2

Porto Rico

GROSSENBACHER, Ernest, Assistant Chief Engineer, Fajardo Sugar Co., Fajardo

South America

BASH, Herbert, Chief Engineer & Partner, Adolfo Bash & Co., Buenos Aires, Argentine
FOULDS, Henry William, Engineer, Fairbanks, Morse & Co., Buenos Aires, Argentine

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

New York

CARVER, Fred S., Proprietor, Fred S. Carver, New York

Ohio

EMENY, Frederick J., Chief Engineer and Director, The Deming Co., Salem

PROMOTION FROM ASSOCIATE-MEMBER

Florida

KENNEDY, Sidney G., General Foreman, Atlantic Coast Line Railroad, Lakeland

Michigan

WRIGHT, James A., President, Wright Fisher Engineering Co., Detroit

New York

WOODS, Samuel H., Engineer, International Motor Co., New York

Pennsylvania

MacLEOD, Norman M., Mechanical Engineer, Wheeler Condenser Co., Philadelphia

Canada

BERTRAM, H. G., The John Bertram & Sons Co., Ltd., Dundas, Ont.

PROMOTION FROM JUNIOR

Illinois

CLEMMER, David P., Secretary & Engineer, Super Reflex Co., Chicago

Massachusetts

ALDEN, John L., Ludlow Manufacturing Associates, Ludlow
DAYTON, Birge S., Assistant Superintendent, Morgan Construction Co., Worcester
FISH, Matthew R., Chief Draftsman, American Steel & Wire Co., Worcester

Nebraska

SLOMAN, Hubert E., Assistant to Chief Architectural Draftsman, Union Pacific Railroad Co., Omaha

New Jersey

WATERS, D. Vaughn, Assistant to Chief Engineer, Ivers-Lee Co., Newark

New York

FERRIS, Donald McK., Superintendent of Heating, Ventilating & Power Plant Construction, Wells & Newton Co., New York
SAXBY, Lewis E., Mechanical and Electrical Engineer, Marine Department, Standard Oil Co. of New Jersey, New York
SCOTT, Walter Glenn, Vice-President and Director of Engineering Practice, C. E. Knoeppel & Co., Inc., New York
STOCKMANN, Erling B., Marine Superintendent, Astmahco Navigation Co., New York
WIRTH, Gustave A., Brooklyn

Pennsylvania

HESS, H. L., Philadelphia
PECKER, Joseph S., Machine & Tool Designing Co., Philadelphia
WESTBROOK, James Richardson, Mechanical Engineer, J. B. Owens Continuous Tunnel Kiln Co., Pittsburgh

England

WEIDENBACKER, Robert W., Assistant to Manager London Office, Baldwin Locomotive Works, London, S. W. 1

SUMMARY

New Applications	235
Change of Grading:	
Promotion from Associate	2
Promotion from Associate-Member	5
Promotion from Junior	15
Total	257

In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers

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A.S.M.E. AFFAIRS

Secretary's Letter—Professional Sections Notes—A.S.M.E. Council Notes—Conference of Local Sections at A.S.M.E. Annual Meeting—Recent and Coming Section Meetings—Personals—Necrology—Employment Bulletin—Candidates for Membership

The Annual Meeting

Secretary's Letter

For variety of professional session, eminence of persons attending, and opportunity, under delightful circumstances, for renewing and extending acquaintances, the 1920 Annual Meeting by common consent excelled all previous gatherings of the Society.

Indeed, so great has become the attendance with the increasing interest, that it has been found necessary with the mounting costs to ask the members to pay a small fee for their guests. But even with this charge, to which I am able to report no objection has yet been made, the registration, nearly 2200, exceeded that of previous years.

Praise for the conduct and interest of the meeting has been universal and many oral and written messages have been received, one outstanding expression of approval being from a Past-President who writes as follows:

> Permit me to add a word of congratulation for the admirably efficient way in which everything went off pertaining to the recent Annual Meeting. In many years of attendance on such functions of various societies I have never taken part in a meeting that was so full of interest or in which all interests had so much to satisfy them. Also, I am delighted with the spirit of service to the distant member which plainly permeates the Society's Monthly Journal.

It has been the constant effort of the officers of The American Society of Mechanical Engineers, and ever since your Secretary has been connected with the Society—first as a member of the Meetings and Program Committee, and then later when asked to become Secretary—to put themselves out to serve the distant member, to make it really a national society. The Sections movement, both geographical and professional, the Library service, the employment service, the Engineering Index, the Survey of Engineering Progress, etc., are all concrete evidences of a devotion to the national interests of the profession. At the same time the individual personal wants of any member, no matter where he may be located, are most solicitously cared for.

Nothing could give greater satisfaction to the members of the numerous committees who contributed to the above result than to know that their efforts are recognized and appreciated, and the foregoing comment by one of the most acute observers in the Society, one who has been around the world and in every corner of this continent time and again, is the most satisfying commendation possible.

CALVIN W. RICE,
Secretary.

Fortieth Anniversary Addresses

The speeches made in New York on the occasion of the celebration of the Fortieth Anniversary of the Society on November 5, 1920, together with letters of congratulation received, are being published in a small pamphlet for limited distribution, and any member who desires a copy should request one of the Secretary.

New Committee Appointments

The new appointments on the Standing Committees of Administration are announced in the Council notes for the December 10th meeting on page 19 of this issue.

Theodore H. Hinchman, appointed on the Finance Committee, has been a member of the Society since 1895. He was at one time associated with Past-President M. E. Cooley and is now partner in the firm of Smith, Hinchman and Grylls, consulting engineers, of Detroit. Mr. Hinchman was elected by the Local Sections to be a member of the Regular Nominating Committee two years ago.

Luther B. McMillan, reappointed on the Committee on Meetings and Program, on which he has been serving a few months to fill a vacancy, is consulting engineer in the power-plant department of the H. W. Johns-Manville Company. He was formerly instructor in steam and gas engineering at the University of Wisconsin, in which capacity he read an important paper before the Society on the heat-insulating properties of materials. Mr. McMillan has also been active in the Metropolitan Section.

John T. Wilkin, new appointee on the Publication and Papers Committee, receives his first committee assignment. He is president and mechanical engineer of the Connersville Blower Company, Connersville, Ind., with which company he has been connected since 1886. He was elected a member of the Society in 1898.

Arthur M. Greene, Jr., has accepted the chairmanship of the Research Committee for another year. In this capacity Professor Greene has made notable contributions to the literature of the Society in the Engineering Research Section published each month in MECHANICAL ENGINEERING, and it is a source of gratification that he will continue to give his personal time and attention to this work for 1921.

Society Will Inaugurate Awards

Following the adoption by the Society at the Annual Business Meeting of the report of the Committee on Awards and Prizes, the Council will immediately put into effect as many of the provisions as are possible under the present financial conditions.

The first new award to be made will be that of *Life Membership* for the best contribution to the literature of mechanical engineering appearing in the Society's publications for the calendar year 1920. It is hoped that the Committee on Awards will be able to report in time for the result to be announced at the Spring Meeting in Chicago in May.

Regarding the new *A.S.M.E. Medal*, to be awarded for a notable invention, a Special Committee is already working to procure an appropriate design.

The *Honorable Mention* to be awarded for inventions or improvements in engineering can be inaugurated as soon as any members

of the Society present names. Any members of the Society may submit to the Council a full statement of claims for recognition of any one who in their opinion has made an invention or improvement in engineering which merits the attention of the Society.

The *Junior* and *Student Prizes* for the best papers by Junior Members and by enrolled members of Student Branches, respectively, will be awarded as in previous years.

The complete report of the Committee on Awards and Prizes was published in the October 1919 issue of MECHANICAL ENGINEERING, and any members of the Society who are interested should consult this report or may write the Secretary.

Professional Sections Notes

A meeting of the Standing Committee on Professional Sections was held on December 21, and a schedule was drawn up for future meetings of the Standing Committee, as follows: The fourth Friday prior to the Annual and Spring Meetings of the Society and the first Friday subsequent to the Annual and Spring Meetings.

Until the Professional Sections are all functioning, special meetings of the Standing Committee will be held if necessary.

Reports from the several sections were received, of which the following are outstanding items.

The Executive Committee of the *Fuels Section* is contemplating a sub-committee on fuels in every Local Section.

Prof. L. P. Breckenridge, Chairman of the Fuels Section, proposes an A.S.M.E. Code for the Conservation of Fuel, to be issued in card form and hung up in every boiler room, house-heating plant and kitchen in the United States.

The *Management Section* has appointed a joint Committee on Nomenclature of Management with the Society of Industrial Engineers, the Taylor Society, the Industrial Relations Association of America, and the National Association of Cost Accountants. The personnel of this Committee is:

Representing Management Section A.S.M.E.:
F. E. TOWN, *Chairman*,
WALLACE CLARK,
W. D. HAMMERLY (Alternate).
Representing Society of Industrial Engineers:
HARRY A. HOPF,
CHARLES E. FUNK.
Representing Taylor Society:
W. O. LICHTNER,
ROBERT T. KENT,
HENRY WOOD SHELTON (Alternate).
Representing Industrial Relations Association of America:
C. S. CHING,
W. H. WINANS,
MARK M. JONES (Alternate).
Representing National Association of Cost Accountants:
J. P. JORDAN,
DURWARD E. BURCHELL,
C. L. JAMISON (Alternate).

The Committee held its organization meeting in the rooms of the Society on Friday, January 7.

Returns to the questionnaire sent out by the *Materials Handling Section* and published also in the last issue of MECHANICAL ENGINEERING have been coming in steadily and are being collated. This Section expects to conduct a meeting for the Metropolitan Section in Newark, N. J., some time in February.

The Organizing Committee of the *Ordnance Section* has just about completed its ballot for the Executive Committee of the Section.

The *Gas Power Section* issued a call for an organization meeting to be held in the rooms of the Society on January 21.

The *Power Section* expects to coöperate with the Philadelphia Local Section in the Symposium on Hydroelectric Development and Distribution to be held on January 21.

The *Textile Section* has been invited to hold a meeting in Providence and is also planning to hold one in Philadelphia.

AFFILIATES TO BE DEVELOPED

A Sub-Committee on Affiliate Members consisting of Robert M. Gates, George A. Orrok, James Partington and Selby Haar has been appointed to develop ways and means of interesting non-members in membership in the Sections, provision for which is made in the By-Laws. The committee will make recommendations regarding method and form of application, design of membership card, etc.

RULES OF PROCEDURE

Several matters of procedure in the conduct of the Sections have yet to be determined, and a Sub-Committee on Rules consisting of Robert M. Gates, George A. Orrok and James Partington was appointed to make recommendations.

One of the most important matters pending is the rotation of service on the Executive Committees of the Sections. This affects the membership of the standing Committee and the Committee's representation on the Council.

A.S.M.E. Council Notes

Two meetings of the Council were held in connection with the Annual Meeting of the Society in New York. The meeting of December 7 was the last meeting of the 1920 Council and that of December 10 the first meeting of the Council for 1921.

President Miller presided at the December 7 meeting and there were present: President Fred J. Miller; Vice-Presidents Fred R. Low, R. H. Fernald, Henry B. Sargent, John A. Stevens; Managers L. E. Strothman, D. Robert Yarnall, C. L. Newcomb, C. Russ Richards, F. O. Wells, E. C. Fisher, D. S. Kimball, E. F. Scott; Past-Presidents D. S. Jacobus, Ira N. Hollis, Chas. T. Main, James Hartness, Jesse M. Smith; Chairman of Standing Committees: E. S. Carman, Local Sections; G. A. Orrok, Publications; E. B. Katte, Professional Sections; F. A. Waldron, Membership; A. M. Greene, Jr., Research; Officers-elect: E. S. Carman, President-elect, L. C. Nordmeyer, C. C. Thomas, Managers-elect; Secretary, Calvin W. Rice.

Resolutions on Death of Vice-President John R. Allen. The resolutions submitted by the committee consisting of Past-President M. E. Cooley, Prof. H. C. Anderson and Dr. O. P. Hood, were adopted.

William B. Gregory, of New Orleans, La., was appointed to fill the vacancy caused by the death of Dean Allen, as announced in the January issue of MECHANICAL ENGINEERING in which the report of the Special Nominating Committee was published.

Local Sections. The petition for a Tri-Cities Section to include Davenport, Iowa, and Moline and Rock Island, Illinois, was approved.

Power Test Codes. The appointment of C. Harold Berry on the Power Test Codes Individual Committee on Steam Turbines was approved, as well as that of Raymond D. Johnson on the Power Test Codes Individual Committee on Hydraulic Power Plants.

Boiler Code. The appointment of W. P. Eales on the Sub-Committee for Rules for Inspection was approved. The appointment of a representative from the National Board of Pressure Vessels Inspectors to serve on the Sub-Committee for Rules for Inspection was also approved.

Engineering Council. The decision of three of the national societies participating in the Federated American Engineering Societies to withdraw from Engineering Council necessitated the following special resolution:

WHEREAS: The American Society of Mechanical Engineers has become a Charter Member of The Federated American Engineering Societies and has appointed its representatives upon the Executive Board of The American Engineering Council which is not to take over and continue the work of Engineering Council and is prepared to contribute to its support; therefore, be it

Resolved: That the representatives of The American Society of Mechanical Engineers on the Board of Trustees of the United Engineering Society are hereby instructed to concur in an amendment to the By-Laws of the United Engineering Society which has already been proposed of terminating Engineering Council as a department of United Engineering Society.

The amendment to the By-Laws of the United Engineering Society has since been made.

John A. Holmes Association. General W. H. Bixby was appointed as the Society's representative on the Holmes Memorial Association in place of the late Dr. John A. Brashear.

Report from Mr. Yarnall. Mr. D. Robert Yarnall in retiring from the Council described the relief work of which he had had

charge in Germany and reviewed industrial conditions in that country. The Council expressed its appreciation to Mr. Yarnall for the splendid work he had done in connection with European relief.

MEETING OF DECEMBER 10

President Miller called the meeting to order and introduced the new President, Edwin S. Carman, who took the chair. There were present: Vice-Presidents Leon P. Alford, Robert B. Wolf, R. H. Fernald; Managers C. L. Newcomb, C. Russ Richards, F. O. Wells, E. C. Fisher, C. F. Scott, L. C. Nordmeyer, Henry M. Norris, C. C. Thomas; Past-Presidents Ira N. Hollis, Chas. T. Main, D. S. Jacobus; Chairman of Standing Committees; F. E. Law, Finance; E. B. Katte, Professional Sections; W. H. Kenerson, Local Sections; G. A. Orrok, Publications; Secretary, Calvin W. Rice.

Secretary. Calvin W. Rice was reappointed Secretary for the year 1921.

Executive Committee. The President nominated D. S. Jacobus, Fred J. Miller, D. S. Kimball, L. P. Alford with himself as Chairman to serve as the Executive Committee of the Council for 1921.

Standing Committee Appointments. The President announced the following appointments on the Standing Committees of Administration:

Finance Committee, THEODORE H. HINCHMAN, Detroit, Mich.
Meetings and Program Committee, L. B. MCMILLAN, New York, N. Y.
Publication and Papers Committee, JOHN T. WILKIN, Connersville, Ind.
Membership Committee, F. A. WALDRON, New York, N. Y.
Constitution and By-Laws Committee, ROBERT I. CLEGG, New York, N. Y.

Foreign Relations. Past-Presidents Ambrose Swasey, W. F. M. Goss and Charles T. Main were appointed a Committee on Foreign Relations to consider invitations to meetings received from engineering societies abroad.

Finances. The Council expressed its thanks and appreciation to the Finance Committee for its efforts to husband the finances of the Society under the present abnormal conditions. The complete report of the Committee was published in the January issue of MECHANICAL ENGINEERING.

Local Sections. The Standing Committee on Local Sections reported the election by the Society, at the Annual Business Meeting, of the Regular Nominating Committee for 1921. The personnel of this Committee was given in the January issue.

Professional Sections. The petition of members of the Society for the establishment of an Ordnance Section was approved and such a section will be formed immediately.

Student Branches. Petitions for Student Branches at the State College of Washington, Pullman, Wash., Rutgers College, New Brunswick, N. J., and Cooper Union, New York City, were approved.

Education and Training in Industry. The report on Education and Training made by the special Committee on Relations with Colleges to the Annual Meeting was referred to Engineering Foundation with the opinion that this subject might be taken up in a larger way by that body.

Appointments. D. S. Jacobus was reappointed on Engineering Foundation; Walter M. McFarland was appointed on the John Fritz Medal Board of Award; Charles F. Brush was reappointed on the Committee on Washington Award, a joint committee with the Western Society of Engineers.

John Fritz Medal Board. On the expiration of his term of service, resolutions of thanks were tendered to Walter M. McFarland for his work as the Society's representative on this Board.

National Research Council. H. deB. Parsons was appointed as the Society's representative on the new Advisory Board on Highway Research of the National Research Council. Daniel E. Moran was appointed as his alternate.

Adjournment. It was voted to adjourn to meet at the call of the Chair.

CALVIN W. RICE.
Secretary.

Conference of Local Sections at the A.S.M.E. Annual Meeting, New York, December 6–7, 1920

THE membership of the Society was better represented than ever before at the Annual Meeting in December through the official delegates sent by the Local Sections. Out of a total of 44 cities where meetings of the Society are now being held, 38 were represented. The Local Sections and the official delegates appointed to represent each are as follows:

Akron, E. P. Roberts
Atlanta, N. C. Harrison
Baltimore, W. W. Varney
Birmingham, F. C. Cutler
Boston, Elmer Smith
Buffalo, B. S. Hughes
Chicago, Prof. H. S. Philbrick
Cincinnati, Prof. J. T. Faig
Cleveland, James H. Herron
Colorado, L. M. Gazin
Columbus, Prof. W. T. Magruder
Connecticut State, C. K. Decherd
Bridgeport, ...
Hartford, S. F. Jeter
Meriden, ...
New Haven, ...
Waterbury, Hugh L. Thompson
Detroit, E. S. Reid
Eastern New York, R. O. Alden
Erie, T. E. Durban
Houston, ...
Indianapolis, Charles Brossman
Los Angeles, H. L. Doolittle
Metropolitan, L. P. Alford
Mid-Continent, D. E. Foster
Milwaukee, F. H. Dorner
Minnesota, A. J. Meyer
New Orleans, W. B. Moses
Ontario, B. Watson
Oregon, ...
Philadelphia, H. P. Liversidge
Pittsburgh, C. W. Bennett
Providence, James A. Hall
Rochester, F. A. Collins, Jr.
St. Louis, F. E. Bausch
San Francisco, Robert Sibley
Syracuse, L. S. Tracy
Toledo, Loring Freed
Tri-Cities, E. Ransom Jackson
Utica, Hubert E. Collins
Virginia, ...
Washington, D. C., G. A. Weschler
Washington State, E. O. Eastwood
Worcester, Wm. Bacon
Lehigh Valley, A. T. Keller and T. E. Butterfield

A study of the program carried out will indicate the proportions which these annual conferences have assumed, and their potential bearing on the policy of the Society.

MONDAY, DECEMBER 6

10.00 a.m. Meeting of National Local Sections Committee—Delegates invited to attend.

2.00 p.m. Sections Conference called to order—Roll Call.
Remarks by Chairman of Local Sections Committee.
Outline of Regional Activities: Pacific Coast, Robert Sibley; Mid-West, Charles Brossman; South, N. C. Harrison; New England, Elmer Smith; Great Lakes, James H. Herron; Metropolitan, Leon P. Alford. Followed by open discussion.

4.00 p.m. Statement regarding relations with Student Branches, by Dr. Ira N. Hollis, followed by open discussion.

4.50 p.m. Election of Chairman and Secretary to group Local Sections for purpose of selecting Nominating Committee.

5.30 p.m. Adjournment of Delegates, and meeting of groups to select Nominating Committee.

8.00 p.m. Call to order—Roll Call.
Ten-minute Addresses by representatives of the six Standing Committees of the Society, followed by open discussion.

TUESDAY, DECEMBER 7

10.00 a.m. Call to order—Roll Call. Delegates present written reports to Chairman.

10.10 a.m. Statement regarding Budget for 1921 by F. E. Law, Vice-Chairman of Finance Committee.

10.15 a.m. Discussion of Budget of the Society for 1921.

11.00 a.m. Aims and Organization: Discussion by delegates on publicity; coöperation between Local Sections; juniors having vote; regional secretaries; desirability of student organizations affiliating with local societies, automatic election of students to membership upon graduation, etc.; increase of membership; miscellaneous.

11.45 a.m. Reports from groups and nomination of Nominating Committee.

12.15 p.m. Adjournment.

12.30 p.m. Luncheon with Council members and Past-Presidents.

President Carman, at the time of the conference chairman of the Committee on Local Sections, called the meeting to order Monday afternoon, saying in part:

This is the Sixth Convention of Local Section Delegates, and I cannot express to you in words the feeling that the officers and the staff here in

headquarters have in having the opportunity to meet with you gentlemen from the various cities throughout the country. We doubly appreciate your coming together in the spirit of helpfulness, in your desire to attempt to help us to solve some of the difficult problems of the Society and help us to discuss and reach conclusions in the line of activities which we are most interested in, and help to build up the Society, not alone from the point of membership, but from the point of activities, that will enable us to maintain the position that we now occupy, that of being one of the greatest professional organizations in the world.

The officers of the National Society desire that each member-engineer in his community become, first of all, a citizen of the community, taking a part in community affairs and his local society first, and then become a national citizen-engineer.

There is a strong call from the engineers of the country that we give more attention to this question of service, service to others, and it seems that the whole country is ready to welcome any group of men who have the ability to suggest anything that will render some sort of a solution to the difficult problems of the day; and the most difficult of all, in my opinion, is that of industrial relations.

Major Fred J. Miller told of the important part which the engineer can and should take in the solving of the various problems connected with industrial relations. He also pointed out the desirability of Local Sections' finding a method of financing themselves, because as the number of Local Sections increases the demands for appropriations from the central body increase, so that it amounts to taking money from oneself. The revenue of the Society comes from its members, and therefore the major technical and professional activities of the Society must suffer if its funds are impaired.

Each delegate from the seven regions of the country as divided for convenience in selecting the Nominating Committee, then spoke for ten minutes outlining the development of Sections and local engineering organizations in his district. A number of excellent suggestions were brought out in these talks and these will be studied carefully by the Committee on Local Sections.

The Chairman then introduced Prof. W. H. Kenerson, of Brown University, Providence, his successor as Chairman of the Committee on Local Sections. Professor Kenerson pointed out the possibility of using the Annual Conference of Sections Delegates as a sort of House of Representatives which would act to recommend to the Council through the Committee on Local Sections, such measures as will be for the general good of the Society. The proposition confronting the Committee on Local Sections, he said, was too big and the responsibility too great for any five members of the Society to undertake without the coöperation of the Sections and their individual members by acting as their representatives in carrying to the Council the things that are desired.

The question of holding regional meetings of the Society was discussed and it was suggested that the country be divided up into districts similar to the divisions for the representatives on the Nominating Committee. Meetings could be held within those regions which would give the advantage of having joint meetings of three or four, or more, different Sections. The thought was advanced, also, that the Spring Meeting of the Society could be held alternately in these various regions, or possibly the Spring Meeting papers could be discussed at simultaneous meetings or meetings in series held in these regions.

Professor Kenerson pointed out that it was desirable to have the Local Sections in different parts of the country take the initiative in urging regional meetings, because the officers of the Society are naturally reluctant to try to force any group of members to undertake an activity which is likely to require a good deal of time and effort to insure its success.

It was announced that a regional meeting of the Atlanta, Birmingham and New Orleans Sections would be held at Mobile, Ala., on April 26, 1921, with the Committee on Local Sections as guest of honor.

The value of having each Local Section send notices of all of its meetings and other activities to every other section was pointed out. These notices when posted on the bulletin board where the meetings of the Section take place help to emphasize the size of the Society and how active its members are all over the country.

Close Connection with Student Branches Advocated

Dr. Ira N. Hollis who has been Chairman of the Committee on Student Branches, the name of which has been changed to the Committee on Educational Training, stated that he had visited a good many of the Student Branches throughout the country, and had come to the conclusion that these Student Branches, over fifty in number, were not close enough to the Local Sections. Continuing, he said:

The Student Branch should be part of the Local Section, not an assembly of boys organized alone and corresponding directly with the Society in New York, but a branch or part of the Local Section.

The Worcester Polytechnic Institute Student Branch of the A.S.M.E. meets every Thursday at eleven o'clock, and it is part of the curriculum that it should meet. There is no option to the student of mechanical engineering whether he shall come or not, and he comes every Thursday, either to present his own paper or to listen to somebody from the outside, particularly from the Local Sections, sometimes to listen to men who come from considerable distances.

By Student Branches being connected with the Local Sections, Dr. Hollis emphasized that he did not mean affiliated with the Local Sections, but actually in membership with the Local Section, and part of it, receiving all notices of the meetings of the Local Section and partaking of all the benefits that may come from the gain in acquaintance with the members of the Local Section, and with some better understanding of the ideas of the profession into which these young men are to go. Dr. Hollis continued as follows:

One of the things in which the Committee on Local Sections can be extremely useful to us, is in the way of producing for the Student Branch some kind of a small syllabus suggesting a program for the year. It is through that element that there is failure of the Student Branches. I asked the Board of Directors of The National Industrial Conference Board if one of their men would not make out a syllabus of interesting subjects in connection with engineering and mechanics for distribution to students all over the country, questions which are agitating engineers today, so that the student will get light on his profession before he goes out to take a part in it. That syllabus was prepared by one of the best men in the field of economics, absolutely fair, and free from any bias on the part of the employer, and still that syllabus is in the hands of the National Industrial Conference Board ready to be sent out, if we get the courage to face all sides of the employment problem.

There is another question: What can we, as a society, do for the student? A study of the question of Student Branches has suggested to us how far The American Society of Mechanical Engineers should interest itself in all kinds of education for our profession. When we come to that, we have to define engineering, not in the way that the scientists or engineers have defined it heretofore, but we must define its field. And as I have stated on previous occasions in defining this field, the first man who fashioned a flint arrowhead was just as much an engineer as the man who makes guns today, so that every man who does anything to help society on the material side belongs to our profession.

That leads logically to the conclusion that this Society should interest itself not only in colleges, but in all the corporations, in all the vocational schools, and in all the methods of training men to do the work that must be done in the fields to which our Society is directing its endeavors.

In the early part of last September we held a meeting of the representatives from about 25 different establishments, ranging all the way from the president of the Westinghouse Electrical Manufacturing Company, to the representative of the National Association of Corporation Schools, representative of the Vocational Board in Washington, and out of it came a recommendation that the second sub-committee of the Committee on Education and Training of our Society should be a sub-committee on the training of men for the industries, because after all that is what we are doing, or that is what we are assisting to do. And there we have an opportunity to influence the labor situation, not by making laws, the force of which will swing like a pendulum from one extreme to the other, but by dealing in a common-sense way with all the problems necessary to create good workmen.

The apprenticeship system is gone—the haphazard system of throwing a small boy into a foundry job and letting him find out what he can in the course of three years—and in my opinion there is no society in this country that can do more for labor than to interest itself in the training of men to do the labor of this country, especially in the training of foremen.

I think the tying together with the Student Branches of all methods of education and training is one of the great pieces of work we have to do. I asked some of the managers of the industries of the city of Worcester, not long ago at a dinner, where there were some thirty-five gentlemen present, if they would pay the money to establish a scholarship in the Worcester Polytechnic for those boys in their industries who had proved themselves more forward and most intelligent, and that group of men put up $400,000 that night before they left the room. We have now forty such scholars in the Worcester Polytechnic Institute, under this special scholarship, sent in from among the employees of the industries to be educated further for the benefit of those industries. That experiment I think should be extended all over the country, the industrial scholarship put into the colleges, so that the best men in all the industries could have the benefit of a higher education.

I had a distinct reason, why I wanted to bring this matter before this meeting. If The American Society of Mechanical Engineers through its Committee undertakes a thoroughgoing report of the different types of education for the engineering profession, it can do that most successfully.

in my opinion, through the coöperation of the various Local Sections throughout the United States. The first thing I should advise doing, for example, would be to ask the Cleveland Section of the A.S.M.E. to make a report on all kinds of education going on in the City of Cleveland, and to make so thorough and impartial a report that anyone could make use of it, employer or employee—a report that would represent the actual facts of the case as to what is going on now.

In the discussion which followed it was the sense of the meeting that members of Student Branches should be encouraged to consider themselves as student members of the Society in the same way that a Junior, an Associate or a Member is considered a member of the organization.

SECRETARY RICE STATES HIS POLICY

Secretary Rice followed the lead of Dr. Hollis in discussing student relations. He said in part:

I am for a big, broad engineering society in every university, and for not emphasizing the branches of engineering while a student is in the university—he must think in terms of his profession, in contradistinction to the terms of mechanical or electrical or civil engineering. We must get away from the idea that a man is a kind of an engineer. He is an engineer first, he is a professional man, and these should be the thoughts in his mind all the time. I am for an all-inclusive engineering society in every college and for having them linked up with the local society in every city in the United States where there is a college.

About student membership—every student becomes a bona-fide student member of the Society when he pays his $2 to his university organization, and his name is entered on the books of the Society and he receives from the Society its journal, MECHANICAL ENGINEERING, at a price less than the paper and the presswork cost the Society. He has the privilege of continuing his student membership in the Society for two years after he graduates, by paying $2 per year.

I am in favor of doing everything we can to make it attractive for student members to become junior members of the Society, but I would strongly advise against providing too many special privileges for the young man who has already been benefited by a college education, as compared with the man who has not had that advantage.

Now, as to coöperation between the Student Branches and the Local Sections, think of the splendid feeling it would produce upon the part of the younger men if every alternate meeting of a Section was held at the university, where they would have a chance to see and to talk to the men they look up to in their profession. In this way you will provide a practical point of contact between the citizens of the town and the university.

There cannot be any doubt whatever but that we should link up our engineering activities with the universities and in the biggest and broadest way, and after we have linked them up we should jointly devote the efforts of the Society and the universities to solving the engineering problems of the day.

NOMINATING COMMITTEE FOR SOCIETY NOMINATED

Leon P. Alford was then elected chairman and Prof. H. S. Philbrick secretary of the delegates for the purpose of organizing as a preliminary body to select the members of the Nominating Committee. The meeting then adopted the following grouping of Sections, which are arranged with a view to bringing together those sections which are contiguous and at the same time, so far as is possible, equalize the number of members of the Society in each group. It is to be noted that this grouping differs from that published in Section Two of MECHANICAL ENGINEERING for January, p. 2, which was incorrect.

GROUP I: Boston (671), Worcester (406), Providence (169), Connecticut (658); total, 1904 members.

GROUP II: Metropolitan, 3065 members.

GROUP III: Philadelphia (1069), Lehigh Valley (146), Baltimore (169), Washington, D. C. (174), Virginia (104), Atlanta (102), Birmingham (112); total, 1876 members.

GROUP IV: Eastern New York (158), Mohawk Valley [Utica] (63), Syracuse (139), Rochester (90), Buffalo (207), Ontario (173), Erie (60), Akron (155), Cleveland (346), Pittsburgh (449), Columbus (98), Toledo (66); total, 2004 members.

GROUP V: Chicago (794), Detroit (475), Milwaukee (267), Minnesota (118), Indianapolis (181), Cincinnati (300), Tri-City (38); total, 2173 members.

GROUP VI: St. Louis (187), New Orleans (68), Houston (78), Mid-Continent (149), Colorado (116); total, 598 members.

GROUP VII: Washington State (77), Oregon (34), Los Angeles (172), San Francisco (241); total, 524 members.

A Correction

In the January issue, Section Two, page 5, in the Report of the Finance Committee, second column, under new fiscal year, the net income from MECHANICAL ENGINEERING was erroneously given as $75,000. The figure should have been $50,000. The total $321,650 is correct.

Recent Section Meetings

ATLANTA:

January 25. Joint meeting with Atlanta Section A.S.C.E. in Carnegie Library, Atlanta, Ga. Water Power Development, by B. M. Hall, Georgia Railway & Power Co., Atlanta, Ga.

BIRMINGHAM:

December 29. The Land of Promise, as It Is Seen Today, by H. Y. Carson, former Captain U. S. A. (with General Allenby). This talk was illustrated with lantern slides.

CHICAGO:

January 24. Labor, by Messrs. Fred J. Miller and L. P. Alford.

CINCINNATI:

January 21. The Engineer and His Opportunity, and The Federated American Engineering Society—Its Organization and Object, by E. S. Carman, President A.S.M.E.

CLEVELAND:

January 4. Recent Developments and Modern Tendencies in Machine Design, by A. L. De Leeuw, 127 Water St., N. Y. C.

COLORADO:

December 29. Rubber Compounding and Tire Construction, by John G. Gates, of the Gates Rubber Co.

January 28. Industrial Expansion of Colorado, by Charles C. Gates, President of the Gates Rubber Co.

COLUMBUS:

January 14. The Story of Petroleum. Motion picture from the Bureau of Mines.

CONNECTICUT:

HARTFORD:

January 10. The Responsibility of the Coal Consumer, by C. E. Lesher, Editor of *Coal Age*, New York City.

MERIDEN:

December 21. Heating Systems, by Charles N. Flagg; Automobile Storage Battery, Norman H. Schleiter; Spark Advance, by Charles E. Stahl.

WATERBURY:

January 3. Mining Experiences of a Prospector, by Captain Harry L. George. Moving pictures of Byers Wrought Iron Pipe were shown.

METROPOLITAN:

January 28. Marine Electrical Engineering, Alfred E. Waller in charge of meeting.

ONTARIO:

December 17. Visit to the Central Technical High School, at which time Mr. Harry H. Angus, engineer at the school, gave a talk on engineering features of the plant and building.

PHILADELPHIA:

January 21. Symposium on Hydroelectric Power and Distribution, held under the auspices of the Engineers' Club of Philadelphia and the Philadelphia Section of the A.S.C.E., A.I.E.E. and the A.S.M.E. An account of this meeting will be given in the next issue of MECHANICAL ENGINEERING.

PROVIDENCE:

January 14. Mechanical Fabrics, by Professor George B. Haven, Massachusetts Institute of Technology, Cambridge, Mass. This address was illustrated with pictures and samples of work.

ST. LOUIS:

January 7. The Key Safety Hand-Hole Cap for Water-Tube Boilers, by Fred Key, of the Key Boiler Equipment Co.

SAN FRANCISCO:

December 30. Motion pictures on Refining of Copper. A short talk on the past work of the Society was also given by Dr. W. H. Durand and Robert Sibley.

TOLEDO:

December 1. Joint meeting with the Toledo Chapter of the Doherty Fraternity. Moving picture lecture on The Manufacture of Wrought Iron Pipe, by Fletcher Collins, of the A. M. Byers Co., Pittsburgh, Pa.

January 11. The Need of Business Training in Engineering, by Dr. Quillan, of Toledo University, Toledo, Ohio.

WORCESTER:

December 16. The Construction of Electrical Power Cable, by C. F. Hood. Looking Backward at the Wire Industry, by A. G. Warren. Reducing Scrap and Waste in a Wire Mill, by W. G. Hall.

PERSONALS

Gerald A. Boate announces that he is now assistant director of technical education, Department of Technical Education, Province of Nova Scotia, and is located at the Nova Scotia Technical College, Halifax.

Luther A. Davis, formerly production superintendent of the Standard Screw Company, Corry, Pa., and more recently with the Hydraulic Pressed Steel Company, Cleveland, Ohio, is now connected with the Lamp Equipment Division of the National Lamp Works, General Electric Company, Cleveland, Ohio.

Julius Credo, formerly superintendent of the Hildick Apple Juice Company, Mt. Kisco, N. Y., is now with the Louisville Drying Machinery Company, Louisville, Ky.

Frank J. Baumann, formerly mechanical draftsman for The Barrett Company, Philadelphia, Pa., is now with the Tubize Artificial Silk Company of America, Hopewell, Va.

L. A. Baldwin is now associated with the H. W. Johns-Manville Company, St. Louis, Mo. He was formerly superintendent of the Boiler Department of the Empire Gas & Fuel Co., Eldorado, Kan.

Fred. L. Crane has left the West Penn Power Company, Pittsburgh, Pa. and is now located with the Elizabeth *Daily Journal*, of Elizabeth, N. J., as assistant to the business manager.

D. W. Fraser, formerly general manager of the Montreal Locomotive Works, Ltd., is now located in New York City. Mr. Fraser is vice-president of the American Locomotive Company.

William Allen Harris, Jr., is now a student engineer at the Deane Works of the Worthington Pump and Machinery Corporation, Holyoke, Mass.

William Hiltz, formerly manager of the Certigraph Company, Cincinnati, is now general superintendent of construction for The Lamson Company, Boston, Mass.

Wilbur H. Judy announces his resignation as city manager of the City of San Diego and acceptance of the position of Pacific Coast manager of the Super-Refined Metals Company of Los Angeles, Cal.

Charles T. Owens, who until recently has been an inspector for the U. S. Shipping Board, New York, is now superintending engineer of the Black Diamond Steamship Company.

G. Earl Mackenzie has left the Winchester Repeating Arms Company, New Haven, and is now with the H. W. Johns-Manville Company, New York City.

Edward H. Ruck, who was formerly chief engineer for The Automotive Corporation, Toledo, Ohio, is now general manager of the Mobile Tractor Company, Mobile, Ala.

DeWitt M. Taylor has been appointed instructor in mechanical engineering, Massachusetts Institute of Technology, Cambridge, Mass. He was formerly associate-editor of *Power*, New York, N. Y.

C. H. Kessler, formerly senior mechanical engineer, Division of Valuation, Interstate Commerce Commission, San Francisco, Cal., is now examiner, Department of Equipment, United States Railroad Administration, Washington, D. C.

Robert E. Leigh is now cost engineer for the J. G. White Engineering Corporation. He is located in Cleveland, Ohio.

Peter M. King, formerly mechanical engineer for the General Petroleum Corporation of Vernon, Cal., is now with the Continental Mexican Petroleum Corporation, Tampico, Mexico.

J. W. McCausland announces that his business connection has been changed from the Amalgamated Machinery Corporation to the western office of the Griscom-Russell Company, Chicago.

Lucien Buck, who was general manager of the Parana Paper Co., Inc., Parana, Brazil, S. A., has returned to the States and is now with the B. F. Sturtevant Company, Boston, Mass.

S. S. Garrett has recently been advanced from assistant professor to professor of mechanical engineering, having received one of the eight professorships recently established in Cornell University in memory of students of the university who gave their lives in the world war.

Victor J. Azbe, consulting engineer of St. Louis, Mo., announces that he is now establishing a laboratory completely equipped for all chemical analyses and physical tests having to do with power-plant economy. This new development will make it possible to supply clients with accurate reports on many details of power-plant efficiency.

J. H. Pennington, formerly with the Baltimore Copper Smelting and Rolling Co., Baltimore, is now general manager, McFarland Foundry and Machine Co., Trenton, N. J.

J. Grady Rollow has resigned his position with E. I. du Pont de Nemours & Co., and is now connected with the Los Angeles Gas and Electric Corporation as consulting engineer.

Albert R. Dismukes has resigned his position with Joseph E. Lowes, Inc., Dayton, Ohio, and become associated with the Safe-Cabinet Company of Marietta, Ohio, in the capacity of industrial engineer.

William R. Miller has left the employ of the Hooven, Owens, Rentschler Company, Hamilton, Ohio, and is now with the New York Shipbuilding Corporation, Camden, N. J.

Edward Payson Bullard, Jr., president of The Bullard Machine Tool Company, Bridgeport, Conn., has been awarded the Howard N. Potts Gold Medal by the Committee on Science and the Arts of The Franklin Institute, for his invention of the Mult-Au-Matic Machine Tool.

W. R. Webster has resigned his position as assistant chief engineer for the Cambria Steel Company, Johnstown, Pa., to become general engineer of the Semet-Solvay Company, of Syracuse, N. Y.

Coming Section Meetings

Atlanta.

February 23. Joint meeting with the Birmingham Section in Carnegie Library, Atlanta, Ga.

Boston.

February 8. Water-Power Development and Stand-By Stations as applied to the general subject of Power Development in New England.

Cleveland.

February 1. In the Cleveland Engineering Society Rooms. Uses of Alloy Steel in the Machine-Tool Industries, by R. R. Abbott, of the Peerless Motor Car Co.

Colorado.

February 25. At the Metropole Hotel.

Columbus.

February 11. At the Southern Hotel.

Connecticut.

Hartford Branch.

February 7. At the City Club. Industry's Supply of Energy, by George Otis Smith, Director U. S. Geological Survey.

Waterbury Branch.

February 7. At the Chase Co.'s Office Building, Waterbury, Conn.

New Orleans.

February. Joint meeting with the Louisiana Engineering Society in the Louisiana Engineering Society's Rooms.

Ontario.

February 2. Joint meeting with the Annual meeting of the Engineering Institute of Canada at the King Edward Hotel, Toronto. Effects of Corrosion on Steel Pipe and the Manufacture of Very Large Steel Pipes (up to 96 In.), by F. N. Speller, of the National Tube Co.

Philadelphia.

February 28. At Engineers' Club of Philadelphia. A Broader Field for the Engineer, by Prof. Dexter S. Kimball, consulting engineer, Ithaca, N. Y.

Toledo.

February 18. At Railway and Light Co. Auditorium. Photographing Sound Waves, by Dr. D. C. Miller, of Case School of Applied Science, Cleveland, Ohio. Stereopticon slides will accompany talk.

Utica.

February 10. At Utica Gas & Electric Co. Auditorium, 406 Lafayette St., Utica, N. Y.

A. W. K. BILLINGS, of Barcelona, Spain, is making a brief business trip in the States. Since 1912 he has been engaged in the extensive hydro-electric and other work of the Barcelona company, successively as manager of contruction, managing director, vice-president and consulting engineer. During the war he was in charge of naval aviation construction in Europe and was promoted to the rank of commander and received the Legion of Honor and the Navy Cross for distinguished service in this work.

LOUIS J. EMMONS, formerly with Webster & Libby, Engineers, Portland, Me., is now employed as a designing draftsman at the U. S. Navy Yard at Portsmouth, N. H.

B. W. LATHAM has severed his connection as chief engineer with Cass Gilbert, architect, to accept a position with Murrie & Co., consulting engineers, New York.

F. K. COPELAND, president of the Sullivan Machinery Company, Chicago, Ill., has been named new national councilor of the Compressed Air Society of New York, to represent it in the Chamber of Commerce of the United States.

ELBERT CLEMENT FISHER, for the past nineteen years with Westinghouse, Church, Kerr & Company, Inc., announces that he is connected with Dwight P. Robinson & Company, Inc., with which the former company has become consolidated.

G. A. SCHNEIDER, mechanical engineer with the Standard Steel Car Company, has returned from France and is now located in Chicago.

ETHAN VIALL, editor-in-chief of the *American Machinist* and for ten years a member of their staff, has resigned to become a member of the firm of T. W. Minton & Co., Barbourville, Ky., the largest producers of hickory dimension stock in the United States. Previous to joining the staff of the *American Machinist* Mr. Viall was for three years associate editor of *Machinery*, and before that he was for fourteen years foreman and superintendent in several of the largest specialty manufacturing plants in the Middle West.

RICHARD ROBERTS, who has been employed in an engineering and executive capacity by Guggenheim Brothers and their allied interests for the past five years, has recently resigned to accept a position as sales engineer with the Wayne Oil Tank & Pump Co. at their New York district office, New York City.

JAMES T. WHITTLESEY, for the past eight years engaged in general consulting practice in California, has been appointed director of the Pacific Coast Branch of The Engineering Business Exchange recently opened in San Francisco. This will make available to the engineers and engineering industries of the Coast States the same service in bringing together the buyers and sellers of engineering and technical business properties that is being rendered by the New York office of the Exchange. Mr. Whittlesey was long a prominent figure in the street-railway field, having done some of the pioneer work in street-railway electrification on the Brooklyn street railways, and served as chief engineer of the Public Service Electric Company of New Jersey, building a number of that company's large power stations and developing a comprehensive ten-year program for the unification of the various plants and systems in New Jersey, which has since been closely followed.

JOHN B. MATTHEWS, consulting engineer and surveyor, San Francisco, is now designing the first large turbo-electric driven passenger and cargo steamer to be built on the western coast, and will have entire supervision of its construction.

LEE H. BENSON has been appointed president and general manager of The Amery Manufacturing Company of Amery, Wis., recently organized by him and other business men of Amery. The company has taken over the entire stock of the Western Machine Mfg. Co. of Eau Claire, Wis., and will manufacture the line of engines, pump jacks, wood saws, engine trucks, etc., formerly manufactured by that company.

R. LAURENCE WELDON has resigned as resident engineer for the Fort Frances Pulp & Paper Co. to become mechanical engineer for the Three Rivers Pulp & Paper Co. of Montreal.

BERKELEY WILLIAMS, until recently chief engineer of The F. H. Lawson Company, Cincinnati, Ohio, is now general manager of the Chatham Manufacturing Company, Middletown, Conn.

W. L. CHURCHILL and ALBERT MCDONALD announce the formation of the McDonald-Churchill Corporation, Industrial Engineering Service, New York City. Mr. Churchill, president, was formerly engaged in consulting industrial engineering, and Mr. McDonald, vice-president and general manager, was formerly vice-president of the C. E. Knoeppel & Co., Inc., New York.

THEODORE J. NEDDERMANN, connected with the firm of Messrs. Sale & Frazar, Ltd. at their head office in Tokyo, Japan, for several years has now been transferred to the New York office, Messrs. Frazar & Co., where he will remain for the next two or three years.

NECROLOGY

JESSE WARRINGTON

Jesse Warrington, who became member of The American Society of Mechanical Engineers in 1887, died at his home in Indianapolis, Ind., on November 25, 1920, of heart failure. He was born in Damascus, Ohio, on January 20, 1846, and was educated in the Damascus Academy and the Salem, Ohio, high school.

In his early years Mr. Warrington was employed in various works in Salem first as wood turner and later as machinist, draftsman and designer. He left Salem in 1876 and after two years in Jackson, Mich., with E. Dennis & Co., became connected with the Nordyke & Marmon Co., Indianapolis, where he held the position of designer and mechanical superintendent until 1909, when he was physically incapacitated for business by a slight stroke of apoplexy. While with this company he made important improvements in the machinery and methods for flour production, and a recognition, which he greatly appreciated, was the unexpected receipt of a Diploma of Honorable Mention from the Columbian Exposition for this work in connection with the perfection and production of the machinery upon which his company had received an award at the Exposition.

Mr. Warrington was richly endowed with intellectual gifts, among them being an apparently intuitive knowledge of the principles of mathematics, mechanics and physics. He was the final resource for mathematicians in the several communities in which he resided when they were balked by seemingly insolvable problems.

While at Salem, Ohio, in the middle seventies, he was connected with the Buckeye Engine Co., and his was the mind behind the unusual development of that concern in the theory of steam engineering and the literature which they distributed on that subject. These circulars did much to educate the mass of engine builders, users and operators in the theory of the steam engine.

Mr. Warrington was of Quaker parentage and possessed many of the best traits of that sect. He was conscientious, generous and peace-loving to a fault. Though undoubtedly a real genius he had none of the idiosyncrasies which so frequently accompany extraordinary talent. He was moderate in all of his views, a close thinker, well informed and well read. He contributed much to the development of the past half century.

CHARLES SAMUEL BAVIER

Charles S. Bavier, for the past twenty years chief engineer of the Metropolitan Life Insurance Co. Building, New York City, died on November 27, 1920. Mr. Bavier was born in Jersey City, N. J., on March 4, 1850. He served his apprenticeship with the Oakville Engine & Foundry Co. from 1870 to 1874. He then became assistant to the Chief Engineer of Public Works, Buffalo, N. Y. From 1879 to 1886 he was connected with the following firms in the capacity of master mechanic: W. W. Goodman Meter Co., Philadelphia, Pa., American Meter Co., N. Y., J. L. & W. L. Hastings, contractors, Pittsburgh, and the Louisiana Sugar Refining Co. In 1886 he became superintendent of the latter firm and two years later took charge of the design and erection of the power plant for the New Orleans Cotton Exchange. In 1900 he became chief engineer of the Metropolitan Life Insurance Co. Building.

Mr. Bavier was the inventor of a number of mechanical appliances. He was a member of the American Society of Heating and Ventilating Engineers, the Stationary Engineers, and the Phoenix Society. He became an associate of The American Society of Mechanical Engineers in 1907.

JULIUS A. PERKINS

Julius A. Perkins, formerly mechanical director of the Universal Roller Bearing Co., died on December 7, 1920. Mr. Perkins was born in Hudson, Mich., in November, 1848. He served his apprenticeship as a machinist in Sublette, Ill., and was employed in various machine shops throughout this country and in Bremen and Berlin, Germany, thus obtaining an unusually wide and varied experience. For a number of years he held the position of inspector of manufacturing plants for several fire-insurance companies and his duties concerned all features dealing with fire losses. For sixteen years he designed and superintended the drafting and the manufacture of special machinery and parts in the development of Moffett and Perkins roller and ball bearings, of which he was the inventor.

Mr. Perkins was a veteran of the Civil War, having served in an Illinois regiment. He became a member of The American Society of Mechanical Engineers in 1911. He was also a member of the Society of Automotive Engineers.

JULIUS SHERMAN LANE

Julius S. Lane, for the past eleven years mechanical and consulting engineer with The Engineer Co., N. Y., died on November 29, 1920. Mr. Lane was born in Akron, Ohio, on November 19, 1841. He was graduated from the high school in Akron, Ohio, and then served his apprenticeship as a machinist with the Newark Machine Works, Newark, Ohio.

After his rejection for active service in the Civil War because of physical disability, he returned to Akron as master mechanic in the Taplin-Rice Machine Works. For seventeen years he was a member of the firm of Webster, Camp & Lane Machine Co., where he supervised the building of engines and mining machinery. In 1885 he made an extended trip to Europe, visiting mines in Sweden, Germany and France. Upon his return he became associated as partner and general manager with the M. C. Bullock Manufacturing Co., Chicago, manufacturers of mining machinery. In 1895 he went to South Africa to oversee the erection of machinery for the Johannesburg gold mines, and was there at the outbreak of the Boer War. In the succeeding years as consulting engineer he visited Canada, Mexico and many of the western states in connection with his mining work.

Mr. Lane became a member of The American Society of Mechanical Engineers in 1882. He was also a member of the American Institute of Mining and Metallurgical Engineers and of the Ohio Society of New York. He was a member of the New York City Public School Lecture Course and gave many lectures on the gold and diamond mines of Kimberley.

EMPLOYMENT BULLETIN

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers: non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

ENGINEER in technical department to assist in handling problems of mechanical-engineering nature emanating from negotiations with clients establishing manufacturing operations in properties. Position will embrace various types of industrial experience along process lay-out lines. Certain amount of estimating may enter with other duties. Prefer man between thirty and thirty-five. Location Tenn. X-2.

RECENT ENGINEERING GRADUATES for developing and using new testing machines for sheet metal. Some machine-shop or machine-design experience desirable, but not essential. Candidates are especially desired with extensive training in engineering physics and mathematics; desirable personality an essential. Location Washington, D. C. X-3.

MECHANICAL ENGINEER for veneer package plant, steam power-plant operation; electrical-plant operation and maintenance; woodworking-machine maintenance; planer-saws, veneer lathe and clipper, stapling machines, tenoner nailers. Location Ga. X-4.

MECHANICAL ENGINEER, technical graduate, Protestant, as machine designer and capable of taking charge of drafting room; 3 to 5 years' experience covering textile machinery and thermodynamics preferred. Give full details of education, experience and salary desired. Location Philadelphia. X-7.

RESEARCH ENGINEER qualified in aeronautic work and particularly experienced in instrument work. Location Washington, D. C. X-9.

MANAGER for manufacturing and selling machine for labeling cans. Should like man with some practical merchandizing experience, and some substantial knowledge of production. Particularly interested in one with merchandizing ability and who knows how to develop sales and dispose of such a product. X-13.

CHIEF INSPECTOR in manufacturing establishment. It is necessary that man appointed have good organizing ability, and be experienced in inspection of machinery parts, preferably steam turbines and reduction gears. Z-2217.

MECHANICAL AND ELECTRICAL ENGINEER for work in mechanical department of mining company. Application by letter only. Location Utah. Z-2495.

INSTRUMENT MAKER experienced in precision, optical and electrical measuring instruments. Only man with experience considered. Location New York City. Z-2568.

PROSPECTIVE INDUSTRIAL ENGINEERS—graduates of Canadian Universities for manufacturing firm in Eastern Canada. Successful applicants would undergo course of intensive training for period of about six months, during which all expenses would be paid. Sound knowledge of industrial and economic principles required. Z-2572.

MECHANICAL ENGINEER familiar with design and operation of all forms of drying machinery and japanning ovens. Should have some intimate contact with this class of machinery, and especially in the construction of same. Location New York City, Philadelphia, Boston. Z-2613.

MATHEMATICIAN and COMPUTER. Physicist preferred. Location New Jersey. Z-2620.

ASSISTANT ENGINEER for India. Duties would embrace general supervision and construction work incident to oil installations, packing plants and storage warehouses. Unmarried man of good personality, from twenty-six to thirty years of age, with good engineering education and few years of practical experience. Location New York City. Z-2623.

DRAFTSMAN. Large power company in south has openings for graduate engineers and draftsman with experience in design of hydroelectric power plants. Give full information in first letter. Location Ala. Z-2625.

GRADUATE MECHANICAL ENGINEER WANTED, preferably with pulp and paper-mill experience for large Canadian sulphite mill. Please state age, experience, salary expected and enclose copies of references. Location Canada. Z-2627.

DRAFTSMAN, graduate mechanical engineer. Would be put on all kinds of work occurring in refinery construction and upkeep. Prefer man with at least two or three year's experience, who is married and is in sound health. Promotion and growth will depend entirely upon man. Location Okla. Z-2634.

SUPERVISING ASSISTANT FOREMAN preferably with some technical knowledge and number of year's experience as operating foreman in large industrial plant. Must be practical. Location Newark, N. J. Z-2635.

COMPETENT DRAFTSMAN to take charge of drafting dept. One who has had practical experience, and can design machinery and structural work, systematize and get results from his department. Prefer man at least 35 years old, and one with some experience on electric elevator work if possible. Location New York State. Z-2638.

SALES ENGINEER with thorough technical and practical experience, who is familiar with machine tools and special machinery; capable of heading engineering and sales organization; directing sales development of product thoroughly acceptable to general industries. Must qualify completely as to mechanical knowledge and sales organization executive ability. Details of experience and personal description must be given. Location Ohio. Z-2639.

INSTRUCTORS (4) in mechanical engineering. Recent graduates, from February 1 to July 1, 1921 with hope and expectation of permanent employment beginning September 1, 1921. Location Ohio. Z-2647.

COMBUSTION ENGINEER. Technical graduate, two or more years experience, to take charge of tests and investigations of combustion and operating problems. Applicant to state education, training, experience and salary desired. Location Eastern Ohio. Z-2658.

INSTRUMENT AND TEST ENGINEER, recent technical graduate to take charge of instruments in industrial plant and assist on tests and investigations. Applicant to state education, training and experience. Location Eastern Ohio. Z-2659.

SALES ENGINEER. One familiar with boiler and furnace maintenance and operation, to handle line of furnace specialties in Middle West. Salary and commission. Good opportunity. Write giving experience, training, etc. Z-2664.

SALESMAN for company manufacturing aluminum ware. Confmission only. Special territory will be given. Location N. Y. City. Z-2666.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue and should be limited to 45 words.

CHIEF ENGINEER, experienced on cranes, derricks and hoisting machinery; now with old reliable concern, employing about 150 men; wants to change position. Age 41, married, 6 years in present position. Shop and college training. Salary $4000. SM-5879.

MAINTENANCE ENGINEER. M E. graduate; 5 year's experience in organization, design, construction and maintenance of industrial plants and equipment. Business experience and executive ability give me confidence that, if afforded opportunity, will acquit myself with credit, rendering efficient service. Permanent connection in responsible position desired immediately. Location immaterial. Salary $3300. SM-5880.

EMPLOYMENT SUPERVISOR and experienced interviewer. American; age 37; practical shop and engineering experience. Minimum salary $2400 to start. New England territory, Boston preferred. SM-5881.

MANAGER OF DESIGN. Construction and maintenance department in connection with petroleum industry. Will consider position as manager of engineering sales of oil equipment or other lines. Experienced in design of fuel-oil installations, also oil sales. SM-5882.

FOREIGN REPRESENTATIVE, mechanical-electrical engineer, age 37, American citizen speaks Spanish, Portuguese, German. Ten years selling experience in Latin America and Far East. Desires to represent American manufacturer or export firm. Unquestionable references and satisfactory reason for severing present connection. SM-5883.

MECHANICAL DRAFTSMAN and designer, age 24. Five year's experience on tool, machine maintenance and die-casting work. Desires position of responsibility with good future. Best references as to character and ability. Prefer Cleveland, Ohio or northern Ohio vicinity. Salary $3000. SM-5884.

MECHANICAL SUPERINTENDENT, master mechanic or similar administrative position. Vigorous man of character and ability, wide experience, thorough mechanic and proven executive. Experience covers blast furnaces, mines, railroads, water works, general construction and general shop work. SM-5885.

MECHANICAL ENGINEER, extended gas-engine and meter-manufacturing experience. Steel-mill and safety-engineering experience, chemical-apparatus layout, testing, research, calculating, designing and office work. Age 52. Salary, $3600. SM-5886.

WORKS ENGINEER, high-grade engineer executive with ten years' experience. Capable of handling construction and installing equipment in new plants or rearranging present plants in order to increase production. Have successfully built and equipped two plants. Available immediately. SM-5887.

SALES ENGINEER, age 23. Mechanical-engineering graduate, experienced with materials-handling machinery. Location New York City or vicinity. Salary $2300. SM-5888.

DRAFTSMAN, specializing in plant layout; 20 years experience in machine design and structural work. Age 40, married. Location Philadelphia. SM-5889.

WORKS MANAGER or SUPERINTENDENT, technical education, backed by 23 years' successful executive experience. Thorough technical and practical knowledge of up-to-date organizations. American, age 48. Practical mechanic and mechanical engineer. Especially well trained in manufacture of high precision quantity production. Served 18 months in Ordnance Department with rank of major. Good clean record. Desire to locate with progressive business, where proven ability will be recognized. SM-5890.

POWER and CONSTRUCTION EXECUTIVE. Technical man, age 33; 12 years' experience in all phases of power-plant construction, operation and management and building construction. Desires to take full charge of this work for industrial organization. Now in charge of one of largest central-station construction jobs in this country but will be available within few months. Salary $5000. SM-5891.

MECHANICAL engineer of executive ability. Age 26. Experience covering design and development of methods, tools, machinery and equipment for economical production. Successful organizer experienced in factory management, maintenance and general construction. Would take charge of drafting or design department. SM-5892.

MECHANICAL ENGINEER, graduate M.I.T., broad experience in taking complete charge of design, preparation of plans and specifications and construction of steam power-plant and central-heating plants, also heating and ventilating apparatus for schools, hospitals, factories and public buildings. Accustomed to interviewing architects and committees. SM-5893.

DOMESTIC and FOREIGN SALES REPRESENTATIVE or purchasing agent. Age 37. Technical graduate; 8 years railroad operating and construction departments; 3 years field inspector of materials and equipment; 2 years chief inspector; 3 years foreign and domestic sales, buying and selling; thoroughly acquainted with export requirements. SM-5894.

WORKS ENGINEER, age 27. Technical graduate. Three years' experience on design and installation of steel-mill and chemical-plant equipment. One year operating engineer turbines and engines. Location immaterial. Can arrange New York interview. SM-5895.

REPRESENTATIVE, mechanical engineer graduate, desires representative position in Europe; 6 years' engineering experience on heavy machinery including locomotives. Very able designer. Speaks English, Polish, Russian and German. Well acquainted with European countries and customs. Educated in Germany and U. S. SM-5896.

INDUSTRIAL ENGINEERING EXECUTIVE with 17 years' practical experience, several industries. Would be interested in any major executive proposition, where an aggressive, able man could be given ample environment and attractive compensation. SM-5897.

DESIGNING or DEVELOPMENT ENGINEER, 32, technical education; 6½ years' practical shop experience and 7 years design and construction on artificial-silk and other chemical machinery, pumping machinery, ordnance and railroad. Salary $3600. Philadelphia preferred. SM-5898.

MECHANICAL ENGINEER or EXECUTIVE,

Technical graduate; 19 years' practical, broad engineering and business experience; plant-layout construction; specification and purchase of equipment; tests; maintenance and operation; fuel efficiencies and economies; design, construction and installation labor-saving and material-handling machinery. Competent on manufacturing and shop organization and system. Capable of responsible charge, sales included. Strong credentials. Present salary $5000. SM-5899.

MECHANICAL ENGINEER, graduate of M.I.T. Four years' shop and engineering experience as draftsman and assistant to superintendent. Desires position with progressive industrial or manufacturing concern. SM-5900.

SUPERINTENDENT of adding-machine factory, open for engagement immediately. Twenty years experience in design and manufacture of typewriters, adding machines, magnetos, automobiles, ball and roller bearings, etc. Practically and technically trained for above line of work. Have directed as many as 1,700 hands and can come well recommended with successful record. SM-5901.

INDUSTRIAL ENGINEER, technical graduate, age 29, six years' manufacturing experience. Last three years with two large consulting industrial engineering firms. Have been in charge of contracts embracing time study, rate setting, manufacturing methods, production and stores control, cost accumulation, etc., in combined wood and metal-working plants. Desires position as consulting industrial engineer, location immaterial. SM-5902.

ENGINEERING EXECUTIVE, age 39, technical graduate; 18 years' experience designing, constructing and directing industrial plants. Fully competent to take entire charge small manufacturing concern or engineering department of moderately large corporation. Seeking broader opportunity. Will consider any offer which will justify giving up $6000 position. Can make small investment. SM-5903.

MECHANICAL ENGINEER, age 26, technical graduate. Desires responsible position in technical or commercial capacity. Four years' experience covering shop, drafting, and sales work. Now employed in executive capacity with recuperative furnace concern, work entailing design, erection and sales. Present salary $3100. SM-5904.

MECHANICAL ENGINEER, technical graduate, age 33, married. Ten years shop work, drafting, designing, and layout of mechanical equipment for industrial plants, including power plant, transmission equipment, piping, etc. Desires position either on road or in plant, foreign or domestic service. SM-5905.

MECHANICAL ENGINEER, technical graduate, age 35; married. Experience in railway mechanical work, and long experience in heavy machine and foundry work, desires connection with progressive concern as works manager. SM-5906.

MECHANICAL and POWER ENGINEER, age 28, single. B.S. and M.E. Six years' experience along broad lines, chemical manufacturing, machine shop, metallurgy, sugar engineering, industrial and power-plant practice, operation, layout, design, calculations, steam heating, research, etc. Business and executive ability. Can handle men. Desires connection as mechanical engineer or in similar position. SM-5907.

MECHANICAL ENGINEER, age 35. Technical graduate; 11 years' experience in design, installation, operation and selling industrial plants and equipment. Desires opening as sales engineer or metropolitan representative. SM-5908.

MECHANICAL ENGINEER, age 28. Four years' practical shop experience, 8 years' experience machine design, heating and ventilating, rolling-mill construction and design of jigs and fixtures. Salary moderate if position is permanent and recognized abilities would assure good future. Location immaterial. SM-5909.

MANUFACTURING EXECUTIVE or PLANT ENGINEER. Age 44. Fifteen years productive experience, mechanical, electrical lines. Hidden production leaks my specialty. Promoted through ranks, apprentice to factory manager. Nine years practical, executive experience plant and chief engineer of plants up to 30,000 hp. Thorough technical education, results guaranteed, minimum salary $3,600. SM-5910.

COMBUSTION ENGINEER. Experienced in sales supervision of installation and operation of boilers and boiler-room equipment. Ten years in charge of power-plant operation. Desires position as traveling supervisor of boiler plants or position as sales or service engineer in connection with boiler-room equipment. Age 38. War Service Lieut. U.S.N.R.F. SM-5911.

MECHANICAL ENGINEER with 6 years' theoretical and practical experience in power-plant operation and design, both marine and stationary as well as sales-engineering experience; desires to become associated with organization as combustion or sales engineer whose work covers power-plant equipment and problems in general. Middle Atlantic States. Available immediately. SM-5912.

SALES ENGINEER also experienced in designing and estimating rolling-mill equipment. At present employed; desires to become permanently connected with reputable concern in which he will be given opportunity to invest. Married, age 27; Princeton graduate. Salary $3600. SM-5913.

MECHANICAL ENGINEER and EXECUTIVE, age 31, technical and practical experience covering 15 years on design and manufacture of special automatic machinery, jigs dies, fixtures and machine tools. Experienced plant engineer covering plant-layout repair and maintenance of building-equipment machinery, etc.; also knowledge of production methods, planning and scheduling. Desires opening where initiative and experience along above lines are wanted. SM-5914.

PLANT ENGINEER or assistant plant engineer, M.E. graduate. Age 28, married. Six years experience in engineering from preliminary investigation through design and construction of plant and factory additions and equipment, test work and maintenance. Resourceful and promoter of efficiency and high morale among men. At present employed. Salary $3,000. SM-5915.

MECHANICAL ENGINEER, technical graduate 1917. Age 26, married. Desires opening with future. Now on research work. Practical machine shop work in addition to active technical work in U. S. Army. Vicinity Philadelphia, Pa., preferred. SM-5916.

MECHANICAL and DESIGNING ENGINEER with 11 years' experience on machine design, tool designing, processing of product. Five years in executive capacity as chief draftsman. Highest references. SM-5917.

PRODUCTION MANAGER or assistant to works manager; 20 years practical experience in shops and executive positions. Specially qualified to organize and manage production and planning departments both central and shop plants manufacturing either light or heavy machinery. Age 39. Excellent references. Available immediately. SM-5918.

SALES ENGINEER experienced in Japan, China and Philippine Islands, desires to get in touch with manufacturers interested in developing business in that territory. Will return to Far East in few months and is in position to handle accounts of three or four manufacturers whose products are suitable for above markets. Is well acquainted with various dealers, importers and large consumers in these countries and can offer exceptionally complete and efficient service. SM-5919.

FACTORY SUPERINTENDENT assistant. Graduate mechanical engineer (evening college). Age 26, 11 years' experience, design of labor-saving devices, tools, dies, etc., for interchangeable production; desires position as assistant to production or factory engineer. SM-5920.

TECHNICAL GRADUATE, age 30, married; 9 years' practical experience, desirous of changing to selling side of engineering; iron and steel company or house handling engineering materials preferred. Initial salary of secondary consideration if prospects of future advancement are good. Philadelphia or vicinity preferred. SM-5921.

MECHANICAL ENGINEER, technical graduate, age 25. Three years' experience in drafting room and in field for large sugar company. Field experience covered efficiency, construction and erection work. Desire to locate in production work or with industrial engineering firm. Vicinity New York preferred. SM-5922.

MECHANICAL ENGINEER, age 24. Experienced as sales engineer for large rubber company; instructor in engineering school of prominent university; former officer in engineering division of Ordnance Department. At present employed. Desires position preferably on engineering staff of eastern industrial concern. Position in sales department also considered. SM-5923.

OIL-ENGINE ENGINEER with many years' experience as designer and builder of heavy oil engines wishes to communicate with party interested in taking up manufacture of oil engines in sizes below 500 hp. Advertiser is man of large capacity, having filled responsible positions for many years and is prepared to give convincing proofs of successful record. SM-5924.

MECHANICAL ENGINEER, age 35. Twelve years practical experience on design and construction of special machinery, automatic machinery and machine tools; desires executive position with reliable firm. Good executive. Salary $3500 per year. Location immaterial. SM-5925.

ENGINEER MANAGER, age 34, available March 15, for executive position manufacturing, engineering or export concern. Ten years broad and varied engineering experience, and five years combined business and engineering training, including management, purchasing, sales, production, systematizing; one year Engineer Corps, A. E. F. Foreign or domestic location considered; best references. SM-5926.

MANAGER or SUPERVISING ENGINEER. Technical education, backed by 20 years' successful executive experience. Exceptional organizing and managing capacities. Complete technical and practical knowledge of progressive organization. Practical mechanic and mechanical engineer, with proven ability in developing methods and processes for quality, duplicate production and low costs in shops and factories making munition, typesetting, knitting, coin and tobacco handling, printing, mining machinery, etc., employed up to 4,000 people of both sexes. SM-5927.

MANAGER, GENERAL SUPERINTENDENT or SUPERINTENDENT. Industrial engineer, American, M.E. Age 43. Twenty-three years' broad experience in design, manufacture, construction and operation, investigation and appraisal, cost analysis, purchasing and management of industrial manufacturing plants in several fields. Machinery, steam specialties chemicals, power and hydraulic plants. Open for responsible position. Location immaterial. SM-5928.

ENGINEER, experienced in construction, operation and maintenance of steam and hydraulic power stations. Prefer management of petroleum-producing properties. Experienced in California petroleum production. Oil fuel specialty. Age 45. References furnished. Location immaterial. SM-5929.

ENGINEER and EXECUTIVE, age 36. Desires position as aid to progressive head who can utilize business and engineering ability. Soon to be released after three years government service as executive in production and liquidation. Seven years electric and gas properties experience in charge of design, also inventories, valuations and reports. Six years in general design, shop, and erection. College man; married. Salary $4500. Location in East preferred. SM-5930.

MECHANICAL ENGINEER, technical graduate, Age 25, married. With firm manufacturing well-known line of power-plant equipment since graduation. Experience as designing and as sales engineer. Desires position with engineering firm or in sales office of manufacturing concern. Now employed. Location preferred, northwestern United States. SM-5931.

ENGINEER, age 47; 28 years' general engineering experience. Past 15 as chief engineer with modern steel works in charge of drafting room and construction, power plant, testing, hydraulic presses, furnaces, rolling mills, tools and estimating. SM-5932.

FACTORY EXECUTIVE and mechanical engineer, age 34, American; married. Technical education; 12 years' experience as machinist, draftsman, foreman, chief inspector, shop superintendent on small interchangeable mechanical-parts manufacture, also auto-truck parts on mass production. Excellent references and record as executive. Available immediately. SM-5933.

GRADUATE MECHANICAL ENGINEER, age 31, married, American. Ten years' experience in teaching, experimental and sales. At present employed but will soon be available. Desires to connect with reliable concern where ability in above lines is appreciated. Prefer South or West but will go anywhere. SM-5934.

ASSISTANT PLANT ENGINEER. Mechanical engineer, age 32, technical graduate, with 10 years' mill and power-plant construction experience, desires position as assistant plant engineer or as assistant chief draftsman. Salary desired $3000. SM-5935.

FACTORY MANAGER. In times like these, good management is absolutely essential. This graduate engineer, shop trained, has installed cost and production systems, managed small factory, and been executive with large manufacturer. He can get results in your shop. It will pay you to investigate. SM-5936.

HIGH-GRADE EXECUTIVE, general manager or factory manager. Thoroughly versed in modern methods of manufacturing, production, costs, etc. Inventive ability. Practical mechanic with record of successful achievement in high executive positions and handling of help in small and large plants. At present employed. Age 38. Successful in construction and plant maintenance, designing and building special machinery. Competent to handle large foundry in connection with plant. Salary $8,000 to $10,000. Prefer Chicago but location immaterial. SM-5937.

MECHANICAL ENGINEER, technical graduate;

single; age 33. Fourteen years' experience in design, construction in power plants, heating, ventilation, industrial plants; maintenance work. Reports, correspondence and inspection of branch plants in U. S. Was engineer in Navy. Working knowledge of German. Desires change with future. Location immaterial. Salary $4000. SM-5938.

MECHANICAL ENGINEER and executive. Age 30; 7 years' practical engineering experience. Experienced as assistant to engineer in charge of construction work on industrial buildings, power plants and foundries with duties, estimating, purchasing, supervision of drafting, handling correspondence with field and administrative work. Wishes position with manufacturing or engineering concern. Salary $3600. SM-5939.

RESIDENT ENGINEER, 16 years' experience. Scientific and technical education. Eight years abroad; has supervised design, erection, equipment, operation and maintenance of industrial plants at home and abroad. Handles production, sales and distribution for domestic and foreign trade. SM-5940.

ENGINEERING EXECUTIVE, about to be released from U. S. Army desires to form connection with corporation in need of executive in connection with engineering production, standardization, etc. Thorough theoretical knowledge of engineering in its several branches, coupled with years of experience. Position sought in somewhat above the average. Kindly give synopsis of proposition in first communication. Will consider proposition requiring only part-time services. SM-5941.

ENGINEERING EXECUTIVE. Technically trained man (M.E.) with wide engineering and business experience covering, organization, development, systematizing, operation and management. Prefer Philadelphia or vicinity. SM-5942.

MECHANICAL ENGINEER, Stevens 1911, age 32, married. Recently resigned from Navy. Steam engineer officer during war. Since engaged in design and purchase mechanical equipment. Two years' engineering sales experience office and field. Desires to represent manufacturer or position requiring practical knowledge of steam-plant operation. SM-5943.

PRODUCTION ENGINEER or superintendent, age 37. Eighteen years general machine-shop experience. Thoroughly familiar with shop and central planning department management. Minimum salary $4000. SM-5944.

MECHANICAL ENGINEER, technical graduate, employed for past year and half as equipment and tool engineer, having charge of all planning and purchasing on new $1,500,000 machinery installation in Middle West. Desires new connection, work completed. Salary about $3600. SM-5945.

GENERAL MANAGER, who has successfully developed specialized machinery manufacturing business, engaged both in domestic and export trade, now available. Thoroughly competent engineer, also attorney. Equally capable in organizing, selling or developing a product. Prefer connecting with moderate sized company capable of large expansion and offering future worth giving up $10,000 position. SM-5946.

SALES ENGINEER, age 30, married. Technical graduate. Nine years' practical expetience, desirous of changing to selling side of engineering. Iron and steel company or house handling engineering specialties preferred. Initial salary immaterial if prospects of future advancement are good. Philadelphia or vicinity preferred. SM-5947.

EXECUTIVE ENGINEER, M.E. Cornell. Two years mechanical design, copper mining and smelting; four years electrochemical plant experience, mechanical superintendent and general executive's assistant. One year assistant to department head, large chemical exporting and importing house sales and sales development. Desires connection as assistant to executive or department head. SM-5948.

ENGINEERING EXECUTIVE, technical graduate; 20 years with four leading American firms, desires position. Has designed, manufactured, bought and sold engineering specialties. Speaks foreign languages and would like to connect with business which has possibilities in European markets where he has friends. SM-5949.

MECHANICAL ENGINEER, technical graduate, age 33, married; 13 years' broad experience as chief draftsman, plant engineer and chief engineer in design, construction and operation of industrial plants and equipment. Considerable selling experience along machine-tool, mechanical and general factory-equipment lines. Desires position of responsibility with engineering, manufacturing or selling organization. Salary commensurate to responsibility SM-5950.

MECHANICAL ENGINEER, technical graduate experienced in design, installation and operation of power-plant, heating, ventilating and air-conditioning apparatus, desires permanent position with established firm. Age 30. SM-5951.

MECHANICAL ENGINEER, Columbia graduate. Age 28. Desires position as junior executive with electrical utility company, or in mechanical department of industrial plant. Experienced in construction and operating work, and three-year student course with large central station company. SM-5952.

WORKS MANAGER, general superintendent or development engineer. Practical and technical training, 18 years' experience as toolmaker, chief draftsman, general superintendent and works manager. First-class executive, good hustler and not afraid of hard work. Complete record furnished upon application. Would go anywhere. SM-5953.

MECHANICAL ENGINEER, technical graduate; 10 year's experience as designer on tractors, gas engines, oil-mill machinery, etc., and as teacher of mechanical and experimental engineering; desires permanent position as assistant engineer or chief draftsman. SM-5954.

ENGINEER, EXECUTIVE, age 38, American citizen. Very successful as consulting engineer in oil and refining business and manager with varied experience; educated abroad. Wishes to connect with eastern concern to make reports, appraisals, valuations or as assistant to president. SM-5955.

INDUSTRIAL PLANT ENGINEER, 12 years' general mechanical experience, foreman millwrights, machinist and founder. Specializing in layout of mechanical equipment and reorganizing for economic and efficiency standards. Recently complete $30,000,000 rubber-tire plant layout. Thoroughly familiar with all departments of machine shop, foundry, millwrights, maintenance, installation, erecting, planniag, routing, etc., handling, conveying, storage coal, structural, timber, and concrete. Best references. Age 34, married. SM-5956.

ENGINEER, experienced in preparation of specifications, contracts, analysis of bids, etc., available for evening work. Catalogues, pamphlets, advertisements, compiled, revised and edited. Expert advice on organization, personnel and publicity methods. Consulting engineer on power generation, transmission and application. SM-5957.

HIGHLY TRAINED MECHANICAL ENGINEER. University graduate; master of Science (M.E.) M.I.T. Alex. Hamilton Business Course; age 28. Five years' experience before entering university as steamfitter and contractor, house heating to largest steam-power plants. Considerable operating experience, good executive with ability to handle men. Excellent theoretical knowledge of heat engineering. Employed at present by large New York contracting firm. Salary $3640 plus percentage of profits. SM-5958.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER FEB. 12, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically.

Unless objection is made to any of the candidates by Feb. 12, 1921, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Arkansas

DAVIS, A. G., Chief Mechanical Engineer, National Pump and Well Co., Stuttgart

California

BAIRD, DUDLEY, Engineer and Secretary, Pacific Foundry Co., San Francisco
BALLIET, LETSON, Engineer, Moore Shipbuilding Co., Oakland
DAVIS, EMMET L., General Superintendent, United States Potash Co., Monolith
MACNUTT, HOMER, Superintendent of Motive Power, San Diego Electric Railway Co., San Diego
VAN DEUSEN, EDWARD T., Junior Works Engineer, Moreland Motor Truck Co., Burbank

Connecticut

BLODGETT, ALBERT G., Assistant to Superintendent, Manufacturers Foundry Co., Waterbury
CAMPBELL, L. BARRETT, Chief Draftsman, Andrew C. Campbell, Inc., Waterbury
COVELL, HAROLD S., Mechanical Engineer, Hart & Cooley Co., Inc., New Britain
CURTIS, LEWIS B., President and Treasurer, The Curtis & Curtis Co., Bridgeport
HUDSON, CHARLES L., Tool Designer, General Electric Co., Bridgeport
KREFT, ARTHUR A., Assistant to Mechanical Superintendent, New Departure Manufacturing Co., Bristol
KULJIAN, HARRY A., Power Plant Designer, Edison Illuminating Company of Boston, New Haven
LAKE, EVERETT, J., President, The Hartford Lumber Co., Hartford
LYNCH, FRANCIS T., Assistant General Foreman, Fafnir Bearing Co., New Britain
LYNDE, JOSEPH H. S., Safety Engineer, American Tube and Stamping Co., Bridgeport
MARSHALL, HENRY H., Assistant General Manager, The Automatic Refrigerating Co., Hartford
REKER, CARL H., Assistant in Mechanical Engineering, Yale Sheffield Scientific School, New Haven
SLINGSBY, ERNEST W., Machine Superintendent, The Pratt Read Player Action Co., Deep River
TAYLOR, JOHN H., Mechanical Engineer, Sidney Blumenthal & Co., Shelton
WILLEY, DEAN F., Assistant Engineer, New York, New Haven and Hartford Railroad Co., New Haven
YOUNG, FRANK L., Superintendent, Reid Motor Co., Hartford

District of Columbia

FOSS, FEDOR F., Member Special Russian Mission to United States America, Washington
GARDNER, S. FRANKLIN, Member of Firm, Standard Engineering Co., Washington

Georgia

HOWELL, ROGER S., Associate Professor, Experimental Engineering, Georgia School of Technology, Atlanta
LEECH, HUGH H., Foreman Rod Mill, Atlantic Steel Co., Atlanta

Illinois

EWERT, WILLIAM A., Manufacturing Analyst, Western Electric Co., Hawthorne Station, Chicago
HEARNS, LEWIS M., Mechanical Engineer, The Flintkote Co., Chicago Heights
O'BRIEN, EDWARD J., Assistant Master Mechanic, Certain-teed Products Corpn., East St. Louis
SANDEL, JOHN M., Safety Engineer, Aetna Life Insurance Co., Chicago
STEFFA, HOMER I., Mechanical Engineer, Sanitary District of Chicago, Chicago
THOMAS, LOUIS G. L., Mechanical Engineer, Economy Pumping Machinery Co., Chicago
TYLER, WILLIAM C., Superintendent, Iliff-Bruff Chemical Co., Hoopeston

Indiana

GREENIDGE, ERNEST T. P., Superintendent, Indiana Pipe Line Co., Huntington
NASH, JOHN W., Plant Engineer, Stutz Motor Car Co., Indianapolis
PADDOCK, RUSSELL G., Tool Designer, Indiana Lamp Co., Connersville

Kansas

STAGGS, HORACE M., Superintendent of Operations, Producing Department, Atlantic Oil Producing Co., Florence

Louisiana

REID, JAMES C., Superintendent of Machinery, Foundation Co., New Orleans

Maine

HEDBERG, HAROLD F., Draftsman, Eastern Manufacturing Co., Bangor
TIDMARSH, HARRY E., Manager, Union Iron Works, Bangor

Massachusetts

BARSTOW, RALPH M., General Sales Manager, Greenfield Tap & Die Corpn., Greenfield
BEAN, KARL D., Associated Factory Mutual Insurance Co., Boston
BOSCH, CARL EDWIN, Student Engineer, Blake & Knowles Works, East Cambridge
CARLZ, JOSEPH F., Testing Engineer, Worthington Pump & Machinery Corpn., East Cambridge
CARTY, MAURICE W., Stone & Webster, Inc., Boston
CLARK, LINCOLN, Superintendent, Simplex Electric Manufacturing Co., Cambridge

CONKLIN, WILLIAM F., Designer, Stone & Webster, Boston
CURLEY, WILLARD P., Draftsman, Stone & Webster, Boston
DANEHY, TIMOTHY FRANCIS, JR., Assistant Production Manager, Simplex Electric Heating Co., Cambridge
EASTMAN, MERLE W., Chief Engineer, Boston Elevated Railroad, Boston
FISK, FREDERICK M., Student Engineer, Worthington Pump and Machinery Co., East Cambridge
GILMAN, EDWARD T., Master Mechanic, Boott Mills, Lowell
HAMBLET, GEORGE W., Proprietor and Manager, Hamblet Machine Co., Lawrence
HASTINGS, CHARLES F., Mechanical Superintendent, Turbine Department, General Electric Co., Lynn
HERLIHY, JOHN, Production Engineer, Harpham Barnes Stevenson & Coe, Inc., Boston
JOHNSON, CLYDE W., Mechanical Engineer, Worthington Pump and Machinery Corpn., East Cambridge
KANZ, JOHN EMIL, Mechanical Draftsman, Stone & Webster, Boston
LEE, MARSHALL B., Engineer, John A. Stevens, Lowell
LOWENSTAM, BENJAMIN G., Stone & Webster Engineering Corpn., Boston
LYNCH, JOHN E., JR., Mechanical Designer & Checker, Stone & Webster, Boston
MARSH, CLARENCE E., General Foreman, General Electric Co., Pittsfield
MORSE, JOHN G., Chief Appraiser, Inspection Department, Associated Factory Mutual Fire Insurance Cos., Boston
MOY-DING, WILLIAM, Tester, General Electric Co., Lynn
NORTON, KENRICK M., Mechanical Designer, Stone & Webster, Inc., Boston
PEACHEY, JAMES V., Student Salesman, Worthington Pump and Machinery Corpn., East Cambridge
POLLARD, EDWARD V., Assistant Engineer, General Electric Co., Lynn
RAINEY, MORTON J., Departmental Student, Morse Twist Drill & Machine Co., New Bedford
REYNOLDS, LEWIS M., Draftsman, Stone & Webster, Inc., Boston
TORREY, THEODORE, Accounting Manager, The Biddle & Smart Co., Amesbury
VEINOTE, THOMAS H., Superintendent of Power, Blake-Knowles Works, Cambridge
WARMBOLD, HENRY E., Mechanical Engineer, Edison Electric Illuminating Co., Boston
WOOD, HERBERT B., Draftsman, Lockwood Greene & Co., Boston

Michigan

BARTHEL, OLIVER E., Consulting Engineer, Detroit
BINTZ, CARL, Draftsman, Wickes Brothers, Saginaw
BROW, ERNEST L., Engineer, Ford Motor Co., Detroit
SCHWARTZ, WALTER E. D., In charge Department Factory Records, Acme White Lead & Color Works, Detroit
SOMMER, HENRY G., Factory Engineer, Lansing Stamping Co., Lansing
STEIGER, HERMAN, Mechanical Engineer, The Continental Sugar Co., Blissfield

Mississippi

MACDONALD, JAMES, Engineer, E. L. Young Heading Co., Aberdeen

Missouri

CROFT, TERRELL, Directing Engineer, Terrel Croft Engineering Co., University City, St. Louis
HARTMAN, ELMER E., Standard Oil Company of Indiana, Sugar Creek

New Hampshire

TODD, MITCHELL, Fireman, Parker-Young Co., Lincoln

New Jersey

ANDERSON, HELMER N., Worthington Pump and Machinery Corpn., Harrison
BULLOCK, HARRY L., Chief Tasksetter, The Celluloid Co., Newark
CHAMBERLIN, JAMES S., Assistant Industrial Engineer, Standard Oil Co., Bayway Plant, Elizabeth
EHRMARK, GIDEON, Superintendent, Drill Department, Ingersoll-Rand Co., Phillipsburg
JONES, JOHN B., JR., Engineer Draftsman, Richardson Scale Co., Passaic
KIRBERG, HERMAN A., Assistant to Works Manager, Edison Phonograph Works, West Orange
KUENNE, EDWARD P., JR., Chief Engineer, Downey Shipbuilding Corpn., Arlington
MCLAUGHLIN, JOHN E., Assistant Engineer, The American Sugar Refining Co., Jersey City
MCNULTY, DWIGHT L., Draftsman and Assistant Engineer, Henry R. Kent & Co., Rutherford
MANNING, JAMES G., Designing Engineer, Brunswick Refrigerating Co., New Brunswick
REIDINGER, MAXWELL L., Singer Manufacturing Co., Elizabethport
SHAW, ALFRED A., Assistant Works Accountant, New York Shipbuilding Corpn., Camden
SPARER, JOHN, Designer, United States Rubber Co., Passaic
VAN DERVEER, THEODORE W., Chief Engineer Picatinny Arsenal, Dover,
WALSH, THOMAS M., Draftsman, Vacuum Ash & Soot Conveyor Co., Newark
WATLING, FOSTER E., Designer, Empire Cream Separator Co., Bloomfield
WEIMAN, LEWIS, Newark
WHEATON, WILLIAM E., Works Manager, Walter Scott & Co., Plainfield
WIGGINS, BENN, Chief Draftsman, Hoist Department, Sprague Electric Works, Bloomfield
WOODHOUSE, ROBERT J., Chief Engineer, Manufacturers Liability Insurance Co. of New Jersey, Jersey City

New York

ABEL, JOSEPH C., Draftsman, American Car & Foundry Co., New York
ALDRICH, LEO S., Tool Designer, Willys Morrow Co., Elmira
ARKEBAUER, JESSE O., Brooklyn
BAIRD, HOBART B., Electrical Engineer, The United Gas & Electric Engineering Corpn., New York
BARRETT, WILLIAM E., Consulting Engineer, New York
BERNSTEIN, MORRIS R., Mechanical Draftsman, Duplex Engine Governor Co., Brooklyn
BRADY, JAMES P., Manager, Steam Department, J. W. Knight & Son, New York
BRENNAN, EDWIN L., Chemical Equipment Corpn., New York
BRUNNER, CLARENCE H., Department Manager, Johns-Manville, Inc., New York
BYRNE, LOUIS W., Assistant Manager, Burton Griffiths and Co., New York
CAMPBELL, ROBERT D., Junior Member Chauncey Matlock, New York, Re-election
COXHEAD, RALPH C., Captain, Ordnance Reserve Corps, United States Army, New York
ELLIOTT, GLENN C., Leading Designer, American Car and Foundry Co., New York
FITCH, EDWARD A., Works Manager, Otis Elevator Co., Yonkers
FOGG, ERLON S., Engineer, H. S. Ferguson, New York
FOLTZ, RAYMOND D., District Manager, M. H. Detrick Co., New York
FORSCHNER, ALFRED J., Power Superintendent, National Aniline & Chemical Co., Buffalo
FRANKEL, GILBERT, Engineer, Buffalo Forge Co., Buffalo
HAENSELER, HENRY A., New York
HALPERN, BENJAMIN M., Foreign Department, Worthington Pump & Machinery Corpn., New York
HAMMOND, PAUL H., Production Engineer, New York District Ordnance Department, New York
HARGER, FREDERICK D., Vice-President, Mono Corporation of America, New York
HERZSCH, FREDERIC H., Secretary, W. B. Connor, Inc., New York
HINES, FRANK T., Vice-President and Director of Operations, Baltic Steamship Corpn., New York
HOTALING, LELAND, Assistant Engineer, Andrew Kidd, Jr., New York
HULL, ARTHUR A., Superintendent, Tagliabue Manufacturing Co., Brooklyn
JERICHO, GEORGE B., Factory Superintendent, S. A. Potter, New York
JONES, RICHARD E., Mechanical Engineer, Robert Gair Co., Brooklyn, Reinstatement
LEIBMAN, EDWIN A., Test Engineer, The Flatbush Gas Co., Brooklyn
LEWIS, FRANK S., Assistant Factory Manager, Remington Typewriter Co., Syracuse
LUBASH, MARTIN, Draftsman and Estimator, Alphons Custodis Chimney Construction Co., New York
LUDLOW, G. RICHARD, General Superintendent, Francisco & Jacobus, New York
MCCLURE, B. CARL, General Manager, Insulation and Power Specialties Departments, Johns-Manville, Inc., New York
MADDEN, LOUIS J., General Foreman, Pneumelectric Machine Co., Syracuse
MANNING, VANNOY H., Director of Technical Research, American Petroleum Institute, New York
MEYER, HENRY C. E., Engineer, Construction Department, International Mercantile Marine Co., New York
MILBURN, RICHARD P., Erection Engineer, Audiffren Refrigerating Machine Co., New York
MILLER, LEROY J., Partner, Miller-Lyke Co., Brooklyn
MOE, FRED W., Secretary, Ramp Buildings Corpn., New York
MONTGOMERY, RICHARD B., Assistant Engineer, Bacterial Sewage Purification Co., New York
MUHRER, H. L., Chief Draftsman, Marf Machine and Die Casting Co., New York
PACHE, OTTO, Inspector, De La Vergne Machine Co., Bronx
PETRIE, ROBERT B., Chief Engineer, United American Line, New York
PHILLIPS, RALPH E., Mechanical Engineer, Clyde R. Place, New York
POGUE, JOSEPH E., Manager, Department of Economic Research, Sinclair Consolidated Oil Corpn., New York
QUINN, WILLIAM R., President, Quinn Oil Burning & Torch Co., New York
SALBADOR, HUGH W., Lubrication Engineer, The Texas Co., New York
SEELIG, ALFRED E., President and General Manager, L. J. Wing Manufacturing Co., New York
SENTER, CARL A., Sales Engineer, Hooven-Owens Rentschler Co., New York
SIMONSEN, OTTO C., M. H. Treadwell Co., New York
SMITH, BRONSON H., Chief Mechanical Engineer, American Cotton Oil Co., New York
SONTAG, MAX, Student, Polytechnic Institute of Brooklyn, Brooklyn
SPITZENBERG, HARRY M., Engineering Department, College of the City of New York, New York
STIENER, WALTER A., Detail Draftsman, E. W. Bliss Co., Brooklyn
THOMSON, GEORGE H., Eastern Sales Manager, The Ohio Body & Blower Co., New York
VAN DOVEN, WILLIAM D., International Paper Co., New York
WALSH, DAVID J., Engineer Chief Draftsman, Driggs Ordnance and Manufacturing Corpn., New York
WEISS, MARMION M. L., Senior Draftsman, New York Central Railroad, New York
WELLS, HARRY N., Ventilating Engineer, New York Edison Co., New York
WHITE, WILLIAM K., Superintendent of Production, Hickey Freeman Co., Rochester
WHITTET, ALEXANDER, Mechanical Superintendent, New York Harbor Dry Dock Corpn., Rosebank, S. I.
WURTH, WALTER A., Sales Engineer, Franklin Williams Co., Inc., New York

Ohio

DANA, GEORGE F., President, The Peerless Foundry Co., Cincinnati
EMERY, GEORGE W., Mechanical Engineer, The Froehlich & Emery Engineering Co., Toledo
EMERY, JAMES R., Vice-President, The Froehlich & Emery Engineering Co., Toledo
FORSYTHE, JAMES B., Secretary and Treasurer, The Walter Engineering Co., Dayton
HALE, FRANK B., Mechanical Draftsman, Ordnance Engineering, War Department, Cleveland
HARTMAN, WILLIAM, Superintendent, National Cash Register Co., Dayton
HARTWELL, FLOYD S., Mechanical Engineer, National Supply Co., Toledo
IDOINE, HARRY, Treasurer and Engineer, The Northern Engineering Co., Toledo
KLEIN, CHESTER T., Sales Engineer, The Ohio Body and Blower Co., Cleveland
KLOTZ, AUGUST H., Proprietor and General Manager, Klotz Machine Co., Sandusky
LANE, ALBERT A., President, A. A. Lane Construction Co., Cleveland
MARKER, ROLAND H., Chief Draftsman, Froehlich & Emery Engineering Co., Toledo
NULSEN, MARVIN E., Research Engineer, Hoover Suction Sweeper Co., N. Canton
OWENS, ROY G., Vice-President, The Lakewood Engineering Co., Cleveland
TOMLINSON, MALCOLM C. W., Consulting Engineer, Springfield
WILSON, WILLIAM H., Director Manuel Arts, High School, Springfield
WUENKER, RALPH F., Industrial Engineer, Chace-Wright Co., Cincinnati

Oklahoma

DOBBINS, JOHN P., Assistant Chief Operating Engineer, Cosden & Co., West Tulsa
DOWNARD, JAMES S., Chief Engineer, Continental Asphalt & Petroleum Co., Oklahoma City
HELMRICH, GEORGE B., Assistant Professor of Mechanical Engineering, University of Oklahoma, Norman
LICHTY, LESTER C., Assistant Professor, Mechanical Engineering, University of Oklahoma, Norman

Oregon

BAKER, ERNEST H., Mechanical Draftsman, Spokane Portland and Seattle Railroad Co., Portland

Pennsylvania

BEAVAN, BENJAMIN A., Planning Manager, Hess-Bright Manufacturing Co., Philadelphia
BELLMAN, RUSSELL C., Sales Engine Apprentice, Elliott Co., Jeanette
BLACKBURN, DANIEL M., Engineer, Hendrick Manufacturing Co., Carbondale
BRINGHURST, GEORGE K., Designing Engineer, Albert C. Wood, Philadelphia
CHASE, LYLE C., Mechanical Engineer, Yarnall-Waring Co., Philadelphia
DORRICOTT, CHARLES W., General Foreman Tools, Bethlehem Shipbuilding Corpn., Redington, Bethlehem
DOUGLASS, ALFRED E., Manager, Pulverizing & Crushing Department, Fuller-Lehigh Co., Fullerton
GODSHALK, ERNEST L., Engineering Department, Counties Gas & Electric Co., Norristown
HALYBURTON, JOHN L., Engineer & Sales Manager, Valve Department, American Car & Foundry Co., Berwick
HARRINGTON, EDWARD L., Industrial Engineer, Erie Forge & Steel Co., Erie
HERON, CHARLES M., Squad Leader, Mechanical Draftsman, Westinghouse Electric & Manufacturing Co., Lester
HILLS, JOHN H., Jos. M. Mason Machine Co., Philadelphia
HOFFMANN, AUGUST, General Sales Agent & Gear Cutting Expert on Bilgram Generators, The Bilgram Machine Works, Philadelphia
ISLES, FREDERICK W., Assistant Superintendent, The Atlantic Refining Co., Philadelphia
KEIM, BYRON L., Instructor in Machine Design, Carnegie Institute of Technology, Pittsburgh
LAYCOCK, ARTHUR M., Chief Engineer, The Sheldon Axle & Spring Co., Wilkes-Barre
LEE, BURGESS A., Assistant Manager & Engineer of Marine Decking & Supply Co., Easton
MERTZ, GORDON J., Bethlehem Steel Co., Bethlehem

MILLER, Jay C., Production Engineer, Bethlehem Steel Co., Lebanon
STANLEY, Carroll M., Chief Engineer, United Filters Corpn., Hazleton
WEAVER, James R., Assistant Superintendent of Tools & Equipment, Westinghouse Electric & Manufacturing Co., East Pittsburgh
WETHERILL, Richard W., Chief Engineer, Link-Belt Co., Philadelphia
WILMOT, George W., President & General Manager, Wilmot Engineering Co., Hazleton
WILSON, Howard J., Chief Engineer, The Texas Co., Philadelphia

Rhode Island

BRYANT, Elmer J., Manager, Small Tool Division, Taft-Pierce Manufacturing Co., Woonsocket

South Carolina

ASBURY, Adner D., Jr., Assistant Engineer, Machinery Department, J. E. Sirrine & Co., Greenville
REED, Francis T., Assistant Mechanical Engineer, Standard Oil Co. (N. J.) Charleston
TAYLOR, George A., Sales Engineer, G. G. Slaughter Machinery Co., Greenville

Tennessee

HARRIS, Anderson W., Engineer, The Casey-Hedges Co., Chattanooga

Virginia

PETTYJOHN, Charles R., John P. Pettyjohn & Co., Lynchburg

Washington

LEE, Fairman B., Receiving Clerk, Walworth Manufacturing Co., Seattle

West Virginia

HAYES, William E., Superintendent, Machine Shops, United States Naval Ordnance Plant, South Charleston

Wisconsin

HUGLE, Herman, Designer, Fairbanks, Morse & Co., Beloit
LAMBOY, J. Ray, Architect, Marston Lamboy, Milwaukee
SCHAUER, Harry A., Designer, A. O. Smith Corpn., Milwaukee

Canada

BALFE, John P., Superintendent, Yukon Gold Power Plant, Dawson, Y. T.
HALL, Norman M., Assistant Professor, Mechanical Engineering, University of Manitoba, Winnipeg
HIGGINSON, Thomas H., General Manager, Automatic Sprinkler Co. of Canada, Ltd., Montreal, Que.
TUNNADINE, John, Technical Engineer, Power & Mining Department, Canadian Allis Chalmers, Ltd., Toronto, Ont.
WILKES, Gerald H., Draughtsman, The Goldie & McCulloch Co., Ltd., Galt, Ontario

India

THOMPSON, Eric J., Mechanical Engineer, Anglo-Saxon Petroleum Co., Ltd., Miri, Sarawak, Singapore
WORKMAN, LeRoy W., Chief Draftsman, Tata Iron & Steel Co., Ltd., Jamshedpur, Re-election

Italy

LUIGGI, Mario L., Secretary & President, Gio Ansaldo & Co., Rome

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

California

LAMPMAN, Jay B., Assistant General Sales Manager, Worthington Pump & Machinery Corpn., Los Angeles

Connecticut

PEPPEL, Joseph S., Superintendent of Manufacturing, American Tube & Stamping Co., Bridgeport

Michigan

STEERE, Frank W., Vice-President & General Manager, Steere Engineering Co., Detroit

New York

HARTER, Isaac, Assistant to President, The Babcock & Wilcox Co., New York

PROMOTION FROM ASSOCIATE-MEMBER

California

PIKE, Robert D., Consulting Engineer, Northwest Magnesite Co., San Francisco

Connecticut

HUTCHINSON, John A., Chief Engineer, International Silver Co., Meriden

Illinois

CROWDER, Carl G., Chief of Division, Western Electric Co., Chicago
WEGG, David S., Jr., Engineer, W. A. Gilchrist, Chicago

New York

BOYNTON, John E., Engineer, Mechanical Development Department, Corning Glass Works, Corning
BRYSON, Tandy A., Chief Engineer, Tolhurst Machine Works, Troy
KENT, Herbert S., Process Engineer, Robert Sayre Kent, Inc., Brooklyn
SMITH, W. H. C., Sugar Machinery Engineer, W. R. Grace & Co., New York

Ohio

ALLEN, Hugh L., In charge of Special Scale Department, Toledo Scale Co., Toledo
PHELPS, Paul, Sales Engineer, The Jeffrey Manufacturing Co., Columbus
HARTMAN, George H., Mechanical Engineer, Locomotive Appliance Co., Toledo

PROMOTION FROM JUNIOR

California

HILL, Charles A., Senior Mechanical Engineer, Interstate Commerce Commission, San Francisco

Connecticut

FABENS, Andrew L., Division Superintendent, Landers Frary & Clark, New Britain

Florida

MANSFIELD, Clifford B., International Agriculture Corpn., Mulberry

Illinois

MATCHETT, James C., Secretary, Illinois Engineering Co., Chicago
PFISTERER, George E., Western Manager, Green Fuel Economizer Co., Chicago
WHITE, Merton G., Manager, Cincinnati Office, United States Ball Bearing Manufacturing Co., Chicago

Indiana

CORNELL, Dana R., Works Engineer, Standard Forgings Co., Indian Harbor
HOLMES, William M., Chief of Inspection, The Edward Valve & Manufacturing Co., East Chicago

Maryland

NORRIS, Alexander M., Member of Firm, Chatard & Norris, Baltimore

Massachusetts

ALDRICH, Chester S., Treasurer & Chief Engineer, Gray Aldrich Co., Inc., Boston
FARRELL, Frederick L., New England Manager, Green Fuel Economizer Co., Boston
GILLETT, Charles E., Chief Inspector, Norton Co., Worcester
KONSTANKEWICZ, Michael J., Mechanical Engineer, Warren & Irrgang Co., Springfield
MONTAGUE, Wallace T., Assistant Sales Manager, Norton Co., Worcester

Michigan

DWYER, Emmet, Vice-President & Factory Manager, The Michigan Stove Co., Detroit

Minnesota

LINLEY, Frederick H., Superintendent of Electric Construction, Oliver Iron Mining Co., Duluth

Missouri

ACKERMAN, Frank, Vice-President & Works Manager, Curtis & Co. Manufacturing Co., St. Louis
BLACKMAN, George H., President, Blackman-Hill-McKee Machinery Co., St. Louis
WILMS, Hermann, Lehmann Machine Co., St. Louis

New Hampshire

LATON, Thomas J., Assistant Professor, New Hampshire State College, Durham

New Jersey

DORER, Oscar H., Assistant Centrifugal Engineer, Worthington Pump & Machinery Corpn., Harrison
EBERHARDT, H. Ezra, Secretary, Gould & Eberhardt, Newark
FISHER, William W., Chief Engineer, Monroe Calculating Machine Co., Orange
JENIK, Louis A., Assistant Superintendent, Small Motor Department, Crocker Wheeler Co., Ampere
KIRGAN, John F., Engineer, Ingersoll-Rand Co., Phillipsburg
NEWCOMB, Franklin L., Pressure Still Inspector, Standard Oil Co., Elizabeth
NEWCOMER, Martin, Manager, United States Cartridge Co., Maurer
STILLMAN, Edwin A., President, The Watson Stillman Co., Aldene
WATSON, Herbert J., General Sales Manager, DeLaval Steam Turbine Co., Trenton

New York

ANGELL, Harry J., Sales Engineer, Goulds Manufacturing Co., New York
BESSE, Eldred E., Chief Engineer, Hodgman Rubber Co., Tuckahoe
EDDISON, William B., Member of Firm, Charles E. Richardson & Co., New York
FONDA, Burton C., Assistant Manager, Purchasing Department, Allied Machinery Co. of America, New York
FOWLER, Wallace S., Mechanical Engineer, Habirshaw Electric Cable Co., Yonkers
LANGE, Walter C., Sales Engineer, Uehling Instrument Co., New York
LAWRENCE, Meredith F., Erecting Engineer, General Application Department, Hyatt Roller Bearing Co., New York
LEWIS, Warren D., Chief Engineer, Bradstreet Realty Corpn., New York
MARTIN, Kingsley G., President, K. G. Martin Co., New York
MURRIE, John L., President & Chief Engineer, Murrie & Co., Inc., New York
NATHAN, Alfred, President, Nathan Manufacturing Co., New York
NORRIS, Henry L., Superintendent of Buildings & Grounds, Columbia University, New York
PANUSKA, Frank C., Instructor, Mechanical Drawing & Machine Design, Columbia University, New York
RICE, Myron W., Engineer, Electric Bond & Share Co., New York
RICHMOND, Harold A., Treasurer, Manager & Engineer, General Abrasive Co., Niagara Falls
ROESEN, Robert H., Owner, John H. Muller Co., New York
SHAFTER, R. R., District Manager, Traylor Engineering & Manufacturing Co., New York
SLOANE, Charles O., Export Manager, Betts Machine Co., Rochester
STILLMAN, Thomas B., Marine Department, The Babcock & Wilcox Co., New York

North Carolina

NEALE, William M., Consulting Engineer, Greensboro

Ohio

FLICKINGER, H. W., Chief, Material Section, Engineering Division, Air Service, United States Army, Dayton
HARTLEY, Harry D., Treasurer, Pioneer Pole & Shaft Co., Piqua
LUHN, Clarence W., Vice-President & Engineer, The Jos. Honhorst Co., Cincinnati

Pennsylvania

ESHERICK, Joseph, Philadelphia Manager, The Foxboro Co., Philadelphia
GILLAM, William H., Jr., Vice-President & Factory Manager, Sharples Specialty Co., Philadelphia
HOUSTON, Harold A., Engineer, Westinghouse Electric & Manufacturing Co., E. Pittsburgh
KOPLIN, Robert D., Assistant Mechanical Engineer, Lehigh Valley Coal Co., Wilkes-Barre
LYNN, Thomas H., General Manager, National Manufacturing Corpn., Williamsport
PFEIFFER, Bernard V., Assistant to General Superintendent of Plants, United Gas Improvement Co., Philadelphia
SMITH, Carl D., Engineer, Fuels & Furnaces, Hazel-Atlas Glass Co., Washington
STRAUB, Albert A., Mechanical Engineer, Bureau of Mines, Pittsburgh Sta., Pittsburgh

Texas

FORSYTH, James M., Owner & Manager, Forsyth Engineering Co., Temple

Virginia

JOHNSTON, James A., Member of Firm, Carneal & Johnston, Richmond

Wisconsin

McMULLEN, Cornelius L., General Sales Manager, Fuller & Johnson Manufacturing Co., Madison
PARSONS, Frederick A., Chief Engineer, Kempsmith Manufacturing Co., Milwaukee

Canada

GOLDIE, Alexander R., Manager, The Goldie & McCulloch Co., Ltd., Galt, Ont.
KARCHER, Harry E., Plant Superintendent, Canada Creosoting Co., Ltd., Trenton, Ont.
SPOTTON, Arthur K., Chief Engineer, The Goldie & McCulloch Co., Ltd., Galt, Ont.
WAUGH, Orlo L., Works Manager, The Crown Cork & Seal Co., Toronto, Ont.

SUMMARY

CHANGE OF GRADING:

New Applications	229
Promotion from Associate	4
Promotion from Associate-Member	11
Promotion from Junior	68
Total	312

In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers

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A.S.M.E. AFFAIRS

Chicago Meeting—Secretary's Letter—Committee Appointments Completed—Professional Sections Notes—Doings of Local Societies—Recent and Coming Section Meetings—Personals—Necrology—Employment Bulletin—Candidates for Membership

Chicago Meeting Plans Nearly Complete

The enthusiasm of the Chicago Committee, the coöperation of the various Professional Sections and the fortunate choice of Chicago as a meeting place combine to forecast a Spring Meeting that will demand attendance by every member.

The dates to keep in mind are May 23–26, and the place is the Congress Hotel, Chicago.

The Chicago Sub-Committee promises one session devoted to a consideration of the engineering development of Chicago as the rail-water gateway of the Middle West. The technical program will be supported by strong sessions arranged by the Professional Sections on Aeronautics, Fuels, Machine Shop, Management, Materials Handling, Ordnance, Power and Railroads. The Forest Products Committee is also preparing a program amplifying the interesting session held at the Annual Meeting. The policy of arranging plant visits in connection with the technical papers has been adopted by the Committee on Meetings and Program.

Secretary's Letter

P — C = V

The Secretary is grateful indeed for the inspiration and encouragement he gains in his visits to the Sections and Branches.

In Toledo, Dr. Quillin of the University addressed the Section in a most forceful manner, stating the motive behind all this Society's work in such a splendid manner and then summing it up in the formula given above so that no one will ever forget it.

In this formula P stands for production, C for consumption, and V for value. And applied either to the life of the individual or to an organization it is equally true; the value of that life or organization is in direct proportion to the amount by which its production exceeds its consumption.

At Bethlehem the University Club is as a matter of fact an engineering society, that is, the topics discussed are more frequently on engineering than other subjects. But this is the important part: the club is actively coöperating with the local Chamber of Commerce and the motive in its work can be best illustrated by quoting the announcement in the local paper:

> Sewerage and Sewage Disposal in Bethlehem
>
> Important Topic to be Discussed by State Engineer Snow at University Club Dinner
>
> The annual dinner of the University Club to be held at Kurtz's Restaurant at 7 o'clock, Tuesday, January 25th, will follow somewhat along the same lines as the dinners held in the past few years at which a speaker to present a subject of interest to the community was engaged.
>
> In other words, the Club has endeavored to make these dinners of some value to the community from a civic standpoint.

What could be finer? What greater encouragement can be given to the Secretary of the A.S.M.E. than for him to see that the motive actuating all the work of the Society, and of the Secretary individually, is also that of so many societies and leaders?

Four hundred came out to this dinner, which shows that these functions can be as successful from the point of numbers when the topic has to do with the welfare of the community in which one lives as it can when the purpose is solely to provide an entertainment. And the satisfaction derived from the latter cannot be compared with that from the former.

The Secretary is confident that it will not be long before all engineering societies, national and local, together with their sections, will be putting the emphasis on their civic activities. In so doing they will have their professional work and comradeship made additionally wholesome by the satisfaction resulting from the fact that they have first interested themselves in the welfare of their communities.

Calvin W. Rice, *Secretary.*

Joint Code of Ethics Committee

Responding to an invitation from our Society, the American Society of Civil Engineers has appointed Mr. Leonard Metcalf and Mr. Arthur S. Tuttle, and the American Institute of Mining and Metallurgical Engineers has appointed Mr. Philip W. Henery and Mr. Thomas H. Leggett to coöperate with the A.S.M.E. Special Committee on Code of Ethics.

It was the original recommendation of our Committee that such a joint committee be constituted so that if possible a Code of Ethics could be drafted for all engineers.

It is anticipated that recommendations of the Joint Committee will be presented at the Spring Meeting of our Society in Chicago in May.

Amendments to the Constitution

The two pending amendments to the Constitution, the one on extending the privilege of voting to Junior Members and the other on shortening the time required to complete an amendment to the Constitution, were held over from the Annual Meeting for lack of a quorum at the adjourned Business Session and cannot therefore be again presented until the next Annual Meeting, thus missing one General Meeting, the Spring Meeting.

During the year's delay which will ensue, it will be possible, at the Spring Meeting in Chicago in May, for any member of the Society to introduce any other amendment to the Constitution, and the Society is therefore confronted with a peculiar precedent, and the desirability for Past-President Miller's amendment, which was published in the October 1920 issue of Mechanical Engineering, becomes all the more apparent. Under this proposed amendment,

changes in the Constitution may be recommended at *any* General Meeting (Annual or Spring) instead of only at a Spring Meeting as now, and completed at the next General Meeting. His amendment, if adopted, will remove the inflexibility which now exists and which has created the present situation. At the same time, it does not let down the bars.

Official Biographical Directory of the Four National Engineering Societies

The Library and the offices of the National Engineering Societies are constantly in receipt of inquiries for information about members of the National Engineering Societies and their personal and professional attainments.

Commercial publications giving this information have been undertaken from time to time, but are more or less dependent on a subscription to the issue for inclusion of a member's name in the book. Unsatisfactory correspondence has often followed, where an engineer answering the circular form but with no intention of buying the volume, found later that he was regarded by the publishers as having become a subscriber.

There is some doubt as to the extent of the demand for a publication of this nature and in order to inform their respective Publication Committees of the situation, the secretaries of the several societies have addressed a communication to the Local Sections with the request for a vote on the subject at the monthly meetings of the local gatherings.

If there is a demand for an official, formal directory which would be published under the auspices of the four National Engineering Societies, it is possible that these societies would favorably consider the issuance of such a volume.

This volume would contain material in regard to each man, somewhat along the line of Who's Who in America, that is, a statement of personal data and attainments with a brief description of work accomplished.

Supposing there are 50,000 members in the societies, and allowing a reasonable amount of space allotted to each name, at present prices it might require two volumes at $10 per volume.

An expression of opinion from members outside of the Local Sections is desired in this matter. If you are not within reach of a Local Section, send in your ideas in the matter to the Secretary.

Committee Appointments Completed

President Carman has now filled the vacancies on the standing committees for the year 1921 and most of these committees have organized and are busy on the year's program.

The Finance Committee has unanimously elected Mr. Erik Oberg as Chairman and Messrs. L. C. Marburg and S. D. Collett, Vice-Chairmen. All these gentlemen reside in New York City, though the other two members of the committee live in Detroit and Cleveland, respectively. Although the committees are decentralized from New York as much as possible, it is necessary so to arrange that a quorum of the Finance Committee can be obtained at short notice and also, with the present volume of monthly business of the Society, that at least one member of the Committee be instantly available for auditing bills. The Society now has a turnover of $50,000 a month and the number of bills to be passed for payment every week is quite large.

The Membership Committee has organized with Mr. R. F. Jacobus as Chairman. Since the Local Sections Committee, now handling the increase-of-membership work, anticipates 3000 new members this year, the Membership Committee, already probably the hardest-worked committee of the Society, will have its hands particularly full. The members of the Society should know of the long hours of faithful service rendered by this fundamental committee.

The Constitution and By-Laws Committee has a number of matters pending which have been referred to it by the Council, and since the geographical center of this Committee is now in the West, it is expected that an early meeting will be held in Chicago.

The Committee on Local Sections held a meeting in connection with the meeting of the Council and of the American Engineering Council in Syracuse on February 14 and 15. This will be reported separately.

The Committee on Professional Sections has had active subcommittees working on rules for conducting these sections and on developing affiliate membership therein. Though the by-laws provide for the government of these sections, many new problems have arisen now that they have actually commenced operation.

The Committee on Education and Training is being organized as two committees, one on Training for the Industries and the other on Relations with Colleges, which will handle the Student Branch work. The first of these committees organized in New York on February 5, with Mr. W. W. Nichols as Chairman.

A.S.M.E. Council Notes

The expression of the sentiment of President Carman that the Council meetings considered matters of great interest, led the Council to take a special vote urging all members of the Society to avail themselves of the privilege of attendance at Council meetings and acquaint themselves with the conduct of the Society's affairs. It was hoped that members serving on committees would be particularly interested.

The January meeting was held in New York, on the 14th, and there were present: President E. S. Carman; Vice-Presidents R. H. Fernald, W. B. Gregory, L. P. Alford, R. B. Wolf, J. L. Harrington; Managers F. O. Wells, E. F. Scott, C. L. Newcomb, H. M. Norris; Past-Presidents F. J. Miller, M. E. Cooley, C. T. Main, I. N. Hollis, D. S. Jacobus; Committee Chairmen R. V. Wright, W. H. Kenerson, E. B. Katte, A. M. Greene, Jr.; Guest, Charles Whiting Baker; Secretary, Calvin W. Rice.

Appointments. President Carman reported that he had made the following committee appointments to fill vacancies caused either by the resignation or expiration of terms of office:

Finance: Henry M. Lucas, T. H. Hinchman and S. D. Collett.
Membership: James W. Nelson.
Constitution and By-Laws: Arthur L. Rice and E. L. Ohle.
Standardization: E. C. Peck.
Research: F. G. Hechler.
Library: George A. Stetson and Sidney Bevin.
Tellers of Election: H. G. Tyler, Francis J. Steele and Richard S. Austin.

Finances. The Council expressed its hearty appreciation of the various committees for the way in which they had responded to the request of the Council in restricting their expenditures for the current fiscal year.

Local Sections. Petitions for a Section to be known as the Central Pennsylvania Section and to include territory within a radius of sixty (60) miles of State College, Pa., and for a Section at Spokane, Washington, were approved.

On the invitation of the Committee on Local Sections the April Council Meeting was set for Mobile, Ala., in connection with the joint meeting of the Local Sections of Atlanta, Mobile and New Orleans.

Education and Training. On recommendation of Past-President Hollis the Committee on Education and Training was divided into two main groups, as follows:

Relations with Colleges:
J. W. Roe, Chairman, Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Lynn A. Scipio, Director of Research, Am. Soc. Heating and Ventilating Engineers, U. S. Bureau of Mines, Pittsburgh, Pa.
D. Robert Yarnall, Yarnall-Waring Co., Philadelphia, Pa.
R. H. Danforth, Case Schoool of Applied Science, Cleveland, Ohio.
H. G. Tyler, New York University, New York, N. Y.

Training for the Industries:
W. W. Nichols, Chairman, Allis-Chalmers Co., 50 Church St., New York, N. Y.
Charles R. Richards, Dean of Engrg. School, Cooper Union, New York, N. Y.
R. L. Sackett, Dean of Engrg. School, Pennsylvania State College.
J. C. Spence, Norton Co., Worcester, Mass.
Ira N. Hollis, Worcester Polytechnic Institute, Worcester, Mass.

A meeting of the latter group was called by the chairman for February 5, to be held in New York.

Exchange of Courtesies. The Engineering Institute of Canada requested an exchange of courtesies with our Society and the following resolution was passed:

WHEREAS, The Engineering Institute of Canada is one of the leading engineering societies on this continent; therefore, be it

Resolved, That The American Society of Mechanical Engineers exchange courtesies with The Engineering Institute of Canada, so that the members of each society may secure the publications of the other society at member's rates; and be it further

Resolved, That this exchange of courtesies be interpreted as an expression of the friendship existing between the engineers of Canada and the engineers of the United States.

Procedure for Adopting Codes. Upon the recommendation of Mr. F. R. Low, Chairman of the Power Test Codes Committee, a procedure for presenting and adopting codes of the Society was authorized.

Boiler Code. Interpretations Nos. 312, 313, 318, 322, 323, 325, 327, 329, 330 were approved and ordered published in MECHANICAL ENGINEERING. Messrs. H. V. Wille and Kenneth Rushton were approved on the Sub-Committee on Boilers of Locomotives.

Research. The Research Committee was appointed as the Advisory Board of the Engineering Division of the National Research Council with power to aid members of its sub-committees as required.

Standardization. The resignation of Henry Hess, Chairman of the Committee, was received with regret and resolutions of appreciation of the services of Mr. Hess for many years were ordered transmitted by the President and Secretary.

Publicity. The Chairmen of the Committees on Meetings and Program, Research, Local Sections, and Professional Sections were appointed a Committee on Publicity to supervise such publicity as is given to the Society's work. The Chairman of the Meetings and Program Committee was designated Chairman.

American Engineering Standards Committee. Col. E. C. Peck was appointed as representative of the Society on this joint body. Sponsorship with the American Institute of Architects and American Institute of Electrical Engineers for a Standard Code for Elevators was accepted.

U. E. S. Board of Trustees. Past-President Worcester R. Warner was appointed to represent the Society on this Board.

Adjournment. Adjournment was taken to meet in Syracuse on February 15, in connection with a meeting of the American Engineering Council.

CALVIN W. RICE, *Secretary*

Professional Sections Notes

Aeronautic Section. The Organization Committee of the Aeronautic Section has announced the result of the letter-ballot for the election of the Executive Committee.

Joseph A. Steinmetz, President of the Aero Club of Pennsylvania and member of the firm of Janney, Steinmetz and Company, Philadelphia, Pa., has been elected Chairman.

Thurman H. Bane, Major, Air Service, McCook Field, Dayton, Ohio, has been elected Vice-Chairman.

Edward P. Warner, Professor, Massachusetts Institute of Technology, Cambridge, Mass., Elmer A. Sperry, President, The Sperry Gyroscope Company, Brooklyn, N. Y., and Ralph A. P. Preston, of the Goodyear Tire and Rubber Company, Akron, Ohio, have been elected as the three other members of the Executive Committee.

Edwin E. Aldrin, Lieutenant, Air Service Engineering School, Dayton, Ohio, has been designated as Secretary of the Section.

Ordnance Section. Plans are shaping up for the initial professional meeting of this Section, to be held at Rock Island Arsenal on the adjournment of the Spring Meeting.

Forest Products Section. The Professional Sections Committee favors such a section. Anyone interested should communicate with Mr. Thos. D. Perry, Grand Rapids Veneer Works, Grand Rapids, Mich.

Year Book to be Issued Later

Because of the fact that the 1920 Year Book was corrected to March 1, and on account of printing difficulties was not issued until July 1, it has been decided to postpone the publication of the 1921 Year Book until next October. The book will be corrected to about August 1. The list of officers and committees, usually published in the front of the Year Book will be abstracted in the April issue of MECHANICAL ENGINEERING.

DOINGS OF LOCAL SOCIETIES

CLEVELAND ENGINEERING SOCIETY

The Cleveland Engineering Society held a joint meeting with the Cleveland Section on February 1, 1921. R. R. Abbott, for some years metallurgical engineer for the Peerless Motor Car Company, spoke on the Uses of Alloy Steel in the Machine Tool Industries. Mr. Abbott has met and solved many unusual metallurgical problems in his work with the Peerless Company and has had an opportunity to watch the development of special alloy steels and their uses. His instructive discussion of the subject made the meeting a most interesting one.

ENGINEERS' SOCIETY OF MILWAUKEE

A meeting of the Engineers' Society of Milwaukee was held under the auspices of the Local Section, A.I.E.E. on January 19. This meeting was of special local interest as it was addressed by A. W. Berresford, vice-president and general manager of The Cutler-Hammer Mfg. Co. Mr. Berresford has been very active in the affairs of American engineering societies, holding many offices, and in acknowledgment of his abilities and devotion he was last year elected president of the American Institute of Electrical Engineers.

Mr. Berresford's address dealt with the engineer's relation to the national problems of the development and conservation of our own resources, production and distribution, and relation of capital and labor, and with his participation through the Engineering Council in their solution.

INDIANA ENGINEERING SOCIETY

The Forty-First Annual Meeting of the Indiana Engineering Society was held jointly with other local chapters of Engineering societies at the Claypool Hotel, Indianapolis, January 27–28, 1921. The following excerpts from the program are of interest to us:

Operating Characteristics of Small Steam-Driven Pumps, L. V. Ludy, Lafayette

Some Factors Affecting Locomotive Design, Harry Rubenkoenig, Lafayette

The Manufacture of Silent Chain (illustrated), Charles R. Weiss, Link Belt Co., Indianapolis

Some Problems in Supplying Power Service to Rural Communities, D. D. Ewing, Lafayette

Superpower Station and Transmission System for Central Indiana, F. L. Ray, Anderson

Protection of Rural Distribution, D. L. Curtner, Lafayette

The New 600,000 Volt Testing Laboratory at Purdue University, C. Francis Harding, Lafayette.

PHILADELPHIA ENGINEERS HOLD SYMPOSIUM ON HYDROELECTRIC POWER

The Philadelphia Sections of the American Society of Civil Engineers, The American Society of Mechanical Engineers, and the American Institute of Electrical Engineers, presented a symposium on Hydroelectric Power and Distribution under the auspices of the Philadelphia Engineers' Club on January 21. The following papers were presented:

The Modern Hydraulic Turbine, by Frank H. Rogers, hydraulic engineer, William Cramp & Sons Ship & Engine Building Co.

The Application of a New Method of Water Measurement in the Efficiency Tests of the 37,500-Hp. Turbines of the Niagara Falls Power Co., by Norman R. Gibson, hydraulic engineer, Niagara Falls Power Co.

Speed Regulation of the Hydraulic Turbine, by Raymond D. Johnson, consulting engineer, New York City

The Present Trend of Hydraulic Turbine Development, by Lewis F. Moody, consulting engineer, William Cramp & Sons Ship & Engine Building Co.

Niagara Falls Power Development and Its Products in Philadelphia, by John L. Harper, vice-president and chief engineer, Niagara Falls Power Co.

Electrical Features of Hydroelectric Power, by David B. Rushmore, chief engineer, power and mining department, General Electric Co.

Engineers of Lehigh Valley Form Club

At a meeting of representative engineers and technical men of the Lehigh Valley, including members of the American Electro-Chemical Society, American Society of Civil Engineers, American Institute of Electrical Engineers, American Association of Chemists, American Institute of Mining and Metallurgical Engineers, American Society for Steel Treating, American Society of Mechanical Engineers and several other societies, at the Bethlehem Club, February 7, it was resolved to organize the Engineers' Club of the Lehigh Valley.

The purposes of this club are: first, to facilitate the meetings of engineers and technical men for discussion of technical questions; second, to take up civic, state, and national questions involving engineering and technical knowledge in which the interests of the public may be furthered; third, to promote social intercourse and personal acquaintanceship among its members.

Dr. J. W. Richards, of Lehigh University, was elected temporary chairman, and Professor T. E. Butterfield was elected secretary pro tem. The executive committee will consist of a representative of each of the national societies having members in the Lehigh Valley. Messrs. Larkin, Reinicker and Brobston are the members of the Paper Committee.

The first meeting of the Engineers' Club of the Lehigh Valley, held at Lehigh University on February 24, was in charge of the newly formed Lehigh Valley Section of The American Society of Mechanical Engineers. The subject of the meeting was The Super-Power System and the Industries of the Lehigh Valley, and the speaker was Harold Goodwin, an engineer who is in intimate touch with this development.

President Carman's Day in Cincinnati

Over 150 members of the Local Section welcomed President Carman at an evening meeting held on the occasion of his visit to Cincinnati. Mr. Carman's topic was Engineering Opportunity in America's World-Wide Activities. The members present followed him with great interest as he told of the industrial conditions in the various war-worn nations and outlined America's duty with regard to the industrial rehabilitation of those countries and her obvious destiny in the future. President Carman spent several months in Europe directly following the close of the war, studying the economic situation, which resulted in giving him a first-hand impression of conditions there. J. A. Pollak, chairman of the Local Section, presided at the meeting, which was followed by a buffet lunch.

Preceding the meeting, President Carman spent the day in the various engineering plants of Cincinnati and was entertained at dinner by the directors of the Engineers' Club of Cincinnati and the Executive Committee of the Local Section.

Recent Section Meetings

Akron. February 25. Heat Balance of a Turbine, by C. Harold Berry of the Detroit Edison Co., Detroit, Mich.

Atlanta. January 4. Moving pictures of the Manufacture of Wrought Iron Pipe, from the A. M. Byers Co.

February 23. Joint meeting with the Birmingham Section in Carnegie Library, Atlanta, Ga.

Baltimore. January 18. How to Organize the Economic Forces of the Community, by Charles Ferguson, New York City.

Birmingham. December 29. Glimpses of Present Day Palestine and Jerusalem, by H. Y. Carson, of the American Cast Iron Pipe and Foundry Co. This address was illustrated with lantern slides.

Boston. January 18. Joint meeting with the A.I.E.E. and Boston Section of the Civil Engineers. Electrical Features of the Super Power Survey, by W. S. Murray, of the Department of the Interior. This address was illustrated with lantern slides.

February 8. Joint meeting with the A.I.E.E. Recent Water-Wheel Developments and Settings, by W. M. White, Chief Engineer, Hydraulic Department, Allis-Chalmers Mfg. Co., Wilwaukee, Wis.

Buffalo. February 15. Modern Practice in Arc-Welding, by A. M. Candy, of the Westinghouse Electric & Mfg. Co.

Cincinnati. February 1. At the Western Power Station of the Union Gas & Electric Co. Inspection trip through the plant.

Cleveland. February 1. In the Cleveland Engineering Society's Rooms. Uses of Alloy Steel in the Machine-Tool Industries, by R. R. Abbott, of the Peerless Motor Car Co.

Colorado. February 25. Meeting in the Metropole Hotel.

Columbus. February 11. Meeting in the Southern Hotel.

Connecticut:

Hartford. February 7. At the City Club. Industry's Supply of Energy, by George Otis Smith, Director of the U. S. Geological Survey.

Meriden. January 19. Fuel Economics, by C. C. Trump, Mgr. of the N. Y. Office of the Fuller Engineering Co. Talk was illustrated with lantern slides.

New Haven. February 9. At the Mason Laboratory, New Haven, Conn.

Waterbury. February 7. At the Chase Co.'s Office Building, Waterbury, Conn.

Detroit. February 18. Joint meeting with the Detroit Engineering Society, in the Auditorium of the Board of Commerce. The Engineer in Industrial Reconstruction, by L. P. Alford, Editor, *Management Engineering.*

Eastern New York. January 13. Design and Construction of Superheaters, by H. B. Oatley, of the Locomotive Superheater Co., N. Y. C.

Indianapolis. January 27 and 28. Joint meeting with the A.I.E.E., Indiana Engineering Society, and Civil Engineers.

Los Angeles. January 18. At the Edison Building. Precision Gages of the Johannson Type, by Dr. J. A. Anderson, of Mt. Wilson Solar Observatory, Pasadena, Cal.

February 11. President Carman spoke on Engineering Opportunities in America's World Wide Activities.

Metropolitan. January 28. Joint meeting with the A.I.E.E. A detailed account of this meeting appears on page 216 of Section One of this issue.

Milwaukee. January 19. Joint meeting with the A.I.E.E. and the Engineering Society of Milwaukee. An account of this meeting appears on page 31 of Section Two.

Coming Section Meetings

Atlanta.

March 22. At Carnegie Library, Atlanta, Ga.

Baltimore.

March 22. At the Engineers' Club, Baltimore, Md. Subject: Time Study and Motion Study as Fundamental Factors in Planning and Control, by Frank B. Gilbreth, of Montclair, N. J.

Boston.

March. Joint meeting with other engineering societies. Subject: Diesel Engines.

Cleveland.

March 1. In the Cleveland Engineering Society's Rooms. Subject: Power Plant Evolution, by C. F. Hirshfeld, of the Detroit Edison Co., Detroit, Mich.

Colorado.

March 25. At the Metropole Hotel, Denver, Col.

Philadelphia.

March 22. At the Engineers' Club, Philadelphia, Pa. Subject: Problems of the Young Engineer.

Toledo.

March 17. At Toledo Railways & Light Co., Toledo, Ohio. Subject: Distilled Boiler Feed Water, by George R. Lyons, of the Power Equipment Co. Stereopticon slides will accompany this talk.

Tri-Cities.

March 10. At Rock Island Chamber of Commerce, Rock Island, Ill. Subject: Apprenticeship: Past, Present, and Future, by Wilson P. Hunt, of Moline Tool Co.

Metropolitan.

March 25. In the Engineering Societies Building. Subject: Industrial Relations. Professor Walter Rautenstrauch will be in charge of this meeting.

Important!

About the third week in April, there will be a joint meeting in Mobile, Ala., of the Birmingham, Atlanta and New Orleans Sections. The Council and Local Sections Committee will hold their April meeting in conjunction with this meeting.

New Orleans. February. Joint meeting with the Louisiana Engineering Society in the Louisiana Engineering Society's Rooms.

Ontario. February 2. Joint meeting with the Engineering Institute of Canada at the King Edward Hotel, Toronto. Effects of Corrosion on Steel Pipe and the Manufacture of Very Large Steel Pipes up to 96 inches, by F. N. Speller, of the National Tube Co., Pittsburgh, Pa; Aeroplane Wing Tips and Wind Channel Intakes, both by J. H. Parkin, Jr., of the University of Toronto.

January 21. Special meeting on the Toronto Water Works and Main Pumping Station. Illustrated address by Jas. Milne, M.E. and E.E. of the City of Toronto. Inspection trip through the Main Pumping Station.

Philadelphia. February 28. A Broader Field for the Engineer, by Professor Dexter S. Kimball, Dean of Engineering, Ithaca, N. Y.

St. Louis. January 29. Visit to the Key Boiler Equipment Co., E. St. Louis, Mo.

San Francisco. February 3. Engineering Opportunities in America's World Wide Activities, by President E. S. Carman. Prof. Wm. H. Wright, of the Lick Observatory, Mt. Hamilton, Cal., spoke on the subject of a recently perfected astronomical device for determining the exact dimensions of stellar bodies, the work of Prof. A. A. Michelson, of the University of Chicago.

Toledo. February 18. Photographing Sound Waves, by Dr. D. C. Miller, of the Case School of Applied Science, Cleveland, Ohio. Stereopticon slides accompanied this talk.

Utica. February 10. At the Utica Gas & Electric Co. Auditorium, Utica, N. Y.

Washington, D. C. January 28. Wind Tunnels and Their Uses, by Dr. L. J. Briggs, Chief, Division of Engineering Physics. This talk was illustrated. Measurements of Air Resistance of Projectiles in Actual Flight, by Dr. E. A. Eckhardt, Chief of Sound Section.

Washington State. January 20. In the Assembly Hall, Chamber of Commerce, Arctic Building. Skagit River Project, by C. F. Uhden, Chief Engineer. Illustrated with lantern slides.

Worcester. January 5. Production of Leather and Leather Belting, by F. H. Small of the Graton & Knight Mfg. Co., Worcester, Mass. Three reels of motion pictures were shown during this lecture. Power Transmission by Leather Belting, by F. P. Lindh, of the same company as Mr. Small. This address was illustrated with lantern slides.

PERSONALS

O. W. SANDERSON, formerly assistant engineer of mechanical inventions with the B. F. Goodrich Company, Akron, Ohio, has resigned his position to become secretary and treasurer of the Empire State Engine Corporation, with executive offices in New York, N. Y.

THOMAS L. WILKINSON, for the past ten years in charge of the operating department of the Intermountain Railway, Light & Power Co., a western utilities corporation operating some fifteen plants, has retired from that department and has resumed his consulting work, also design and construction of power and industrial plants, investigation operation and reports on public utilities, appraisals and valuations. His offices will be in Denver.

GEOFFREY C. BROWN, formerly with the Northern Electric Company, Montreal, is now superintendent of manufacturing, Habirshaw Electric Cable Company, Yonkers, N. Y.

WALTER F. LUSK has been appointed mechanical electrical engineer for the International Agricultural Corporation, Mulberry, Fla. He was formerly with the General Utilities & Operating Co., Baltimore, Md.

DANA W. WILBER, formerly assistant engineer to S. Firestone, civil engineer of Rochester, N. Y., is now associated with the Deerben Engineering Associates, Boston, Mass.

IRA T. HOOK announces that he is now assistant professor of strength materials in charge of the Materials Laboratory, Mason Engineering Laboratory, Yale University. He was formerly employed by the General Motors Corporation as expert on physical testing in the Detroit laboratory.

FELIX J. WASILKOWSKI has recently been promoted from assistant to works manager to production and efficiency engineer of The Central Metal Products Corporation, College Point, N. Y., formerly the empire Art Metal Company, Inc.

JOHN R. LEVALLY, formerly sales engineer with the Chicago office of the Locomotive Superheater Company, has been appointed district manager of a new branch recently opened by that company, with headquarters in Pittsburgh, Pa.

JOSEPH J. ZUMBERG has severed connections with The Oesterlein Machine Company of Cincinnati and has taken a position as designer for the Cincinnati Grinder Company.

BRUNO C. LECHLER, formerly general manager for the S. S. Hepworth Company of New York City, is now manager of the Sugar Machinery Department of the Fletcher Works, Philadelphia.

FREDERICK G. KENYON, formerly chief checker in the tool drafting room of the Bullard Machine Tool Company, has resigned and is now instructor in mechanical and architectural drafting and machine design at the State Trade School, Bridgeport, Conn.

SOLOMON E. GILLESPIE, formerly assistant engineer of The Murray Company, Dallas, Tex., has opened an office as consulting engineer in Dallas.

T. B. HOLMES, who until recently was with The Terry Steam Turbine Company of Hartford, is now connected with The K. B. Noble Company of Hartford, as sales engineer.

STEPHEN THOMAS has been appointed combustion engineer for Day & Zimmermann, Inc., Philadelphia. He was formerly with the E. I. duPont de Nemours & Co. of Wilmington, Del., as combustion engineer.

HARRY P. MEREDITH, formerly manager of manufacturing of the Curtiss Aeroplane & Motor Corpn. of Garden City, L. I. and Buffalo, N. Y., has become connected with the Maxwell-Chalmers Motor Company, Inc., of Detroit, Mich., as general works engineer in charge of all building design, changes on construction, plant maintenance and power plant operation for all of the company's plants in Detroit, Dayton, Ohio, Newcastle, Ind., and Canada.

GEORGE S. BLANKENHORN, who was formerly experimental engineer of the Allis-Chalmers Manufacturing Company, and engineer of steam and propulsion machinery of the American International Shipbuilding Corporation, has been chief engineer for the Coen Company, San Francisco, since last August.

FREDERIC GRIMMER, formerly superintendent of the Columbia Hoist & Machine Co., Flushing, L. I., N. Y., is now general manager of the National Indicator Company, Long Island City, N. Y.

JOHN J. MUIR, who until recently was connected with the United States Shipping Board, Emergency Fleet Corporation, has opened offices in Seattle, Wash., to practice as a consulting engineer in marine and general engineering work.

HORACE H. LANE, consulting and designing engineer, is senior member of the newly organized firm of Lane, Davenport & Peterson, engineers and architects, of Detroit.

RAY L. SOMERS has recently resigned his position as plant engineer for the Greenfield Tap and Die Corporation of Greenfield, Mass., and opened an office as industrial engineer in Providence, R. I.

W. H. BOND, formerly mechanical engineer for The Foundation Company, New Orleans, is now with Joubert & Goslin Machine & Foundry Co., Birmingham, Ala.

ALBERT KINGSBURY will henceforth conduct his business of designing, manufacturing, and selling Kingsbury thrust bearings, under the name of Kingsbury Machine Works. His new office and factory are located at Frankford, Philadelphia, Pa.

CHARLES D. H. KELLOGG, formerly manufacturing engineer for the Coe-Stapley Manufacturing Corporation, West Haven, Conn., is now with the Steele and Johnson Manufacturing Company of Waterbury, Conn.

JOHN HUNTER has severed his connection with the Standard Shipbuilding Corporation of Shooters Island, S. I., N. Y., and is now chief engineer for the Heine Safety Boiler Company, St. Louis, Mo.

HARRY A. OSWALD, formerly chief engineer for the Quaker City Corporation of Philadelphia and the Garbowski Motor Truck Company of Detroit, and general manager for the Meriden Manufacturing Company of Indianapolis, has recently been appointed general manager and secretary-treasurer of the Hamilton Motors Company, Grand Haven, Mich.

VALDEMAR B. FISHER, who was formerly representing the Midvale-Cambria Steel Company in Philadelphia and vicinity, is now representing the Atlas Crucible Steel Company in the same district.

JAMES R. LOWE has been appointed general sales manager of the Harrisburg Foundry and Machine Works, with headquarters at Harrisburg. Prior to this connection he was located at Anderson, Ind., as sales engineer for the Midwest Engine Company.

W. C. ROBBINS, of Robbins & Hemple, consulting engineers of Buffalo, announces that for the past ten months he has been general manager for the Eberhart Steel Products Co., Inc., which makes a specialty of automatic screw machine parts, gas engines and airplanes.

ERNEST GLEDHILL, formerly assistant equipment engineer for the Union Metallic Cartridge Company, Bridgeport, is now connected with the General Electric Company, Bridgeport.

RUSSELL JAQUES is now mechanical engineer for the Jaques Engineering Company, New York City. He was formerly designer for the Raymond Concrete Pile Company.

JAMES MACGUIRE, formerly chief inspector of power plant equipment, Air Nitrate Corporation, Muscle Shoals, Ala., is now master mechanic for D. P. Robinson & Co., Inc., and is located at the Colfax Power Station which that company is constructing for the Duquesne Light Company of Pittsburgh.

H. H. MILLS, until recently president of Mills & Sloan, Inc., of Albany, is now consulting engineer, G. Washington Coffee Refining Company, New York, N. Y.

A. E. WINDLE, formerly plant engineer, International Time Recording Company, Endicott, N. Y., is now with the Tide Water Power Company, Wilmington, N. C.

THOMAS R. ALMY, who was formerly engineer for the Atlantic Corporation, Freemans Point, N. H., is now employed in New Bedford, Mass., as plant engineer at the Sharp Mills.

C. E. ANDERSON is now designer for the American Machine & Foundry Co., of Brooklyn, N. Y. He was formerly engineer for the E. W. Bliss Company of Brooklyn.

JAMES W. ARMOUR, who has been stationed at the Detroit, Mich., office of the Murphy Iron Works is now located at the Worcester, Mass., branch of the Sanford Riley Stoker Company.

ALBERT A. DOWD, founder and formerly president of the Service Engineering Company, Inc., New York City, has severed his connection with that company and formed a new organization to be known as the Albert A. Dowd Engineering Co., New York. Mr. Dowd is president and general manager.

CHARLES F. EVELETH, formerly with the Goethals, Wells & Co., Inc., New York, is now in Cleveland, Ohio, with Clark, MacMullen & Riley, consulting engineers.

CHARLES FROESCH has resigned as chief engineer of the S. W. Merritt Company, New York City, to become associated with William E. Kemp, carburation specialist of New York.

EDWARD C. GAINES, of the Mead-Morrison Mfg. Co., Chicago, Ill., is now in Australia in charge of the erection of a large coal handling plant at Sydney, and is looking after other interests of the company in Australia.

LESTER GOODMAN, formerly with the Beech-Nut Packing Company of Brooklyn, is now field engineer for The Chas. E. Bedaux Company, industrial engineers, Cleveland, Ohio. Mr. Goodman is at present located in Boston, Mass.

IRVING G. GRUNDEL, formerly superintendent of refining for the Union Oil Company of California, at Avila, Cal., is now assistant superintendent of the Humble Oil & Refining Company and is located at Houston, Tex.

R. B. FEHR has recently become associated with The Dayton Photo Products Company of Dayton, Ohio, as engineer-physicist and head of the optical department.

D. B. MORRIS has been transferred from the Repauno Plant to the Carney's Point Plant of the Du Pont Engineering Company.

SAMUEL WILLIAM DUDLEY has recently retired as chief engineer of the Westinghouse Air Brake Company, with headquarters at the Wilmerding, Pa., plant, to accept a professorship in mechanical engineering at Yale University. Mr. Dudley has been with the Westinghouse Company for seventeen years and has become prominent in steam and electric railway circles.

A. E. CALL, formerly with the Queen City Coal Company, Cincinnati, is now with the Island Creek Coal Company, New York, N. Y.

W. J. DAVIS, JR., who has been Pacific Coast engineer for the General Electric Company, is now in the railway and traction engineering department of that company at Schenectady, N. Y.

C. M. EASON is now vice-president of the Samson Tractor Company, Janesville, Wis. He was formerly vice-president of the Hyatt Roller Bearing Company.

FREDERICK R. PRATT has severed his connections as engineer with the B. B. & R. Knight, Inc., of Providence, R. I., and is now engineer in charge of all work for the Whitin Machine Works in China and Japan. He is located at Shanghai, China.

R. S. ROWLETT is at present employed in the engineering department of the Eastern Manufacturing Company at South Brewer, Me. He was until recently with the Hyatt Roller Bearing Company, Worcester, Mass.

NECROLOGY

J. WENDELL COLE

J. Wendell Cole, district manager of William Sellers & Co.'s tool and drill-grinder department and the Detroit Emery Wheel Co., died on January 18, 1921 of angina pectoris. Mr. Cole was born in Trenton Falls, N. Y., on June 6, 1842, and received his education in the schools of New York City. He served his apprenticeship in the machine trade with the old Novelty Iron Works, which was the training school of so many of the early members of the Society. His drafting experience was obtained in designing steamship machinery while in charge of construction in that office. He was also chief draftsman in the office of the chief engineer of the Hoosac Tunnel. For two years Mr. Cole was connected with the Fuel Saving Furnace Co., specializing in steam pumps and boiler feeders. It was in 1885 that Mr. Cole became connected with the William Sellers & Co., and in 1876 with the Detroit Emery Wheel Co. in the capacity of district manager.

When as a young man, Mr. Cole was agent for a pump company, he installed the first force pump in a fireboat in New York Harbor, the *John Fuller*. He was a life member of The American Society of Mechanical Engineers, joining the organization three years after its founding in 1880. He was the honorary president of the Ohio State University Student Branch Section at the time of his death.

HORACE ELGIN DODGE

Horace E. Dodge, vice-president and general manager of Dodge Brothers, Detroit, Mich., died on December 10, 1920, at his home in Palm Beach, Fla. Mr. Dodge was born in Niles, Mich., in 1869, and was educated in the schools there. From the high school in Niles, Mr. Dodge and his brother, John F. Dodge, who died about a year ago, entered their father's machine shop; later they worked in the Port Huron machine shops. Their careers are inseparable for where one went, there went the "Dodge brothers."

Opportunity in Port Huron was limited and so the brothers went to Detroit in 1886, where they started work in the Murphy Engine Co. shop. Later they went to Windsor and became machinists in the Dominion Typograph Co. plant, which they eventually became able to lease. Selling out to a Canadian bicycle concern, the brothers returned to Detroit to open a machine shop, the business of which developed slowly. Their first big contract came from the Olds Motor Works and called for three thousand gear sets. It was handled successfully and from that order dated the success which they achieved.

Henry Ford saw their possibilities and gave them an opportunity when he asked their help in the building of the Ford car. Later they entered the automobile business for themselves and established the well-known firm of Dodge Brothers.

Horace E. Dodge became a member of The American Society of Mechanical Engineers in 1915.

PRESLEY J. FICKINGER

Presley J. Fickinger, chief engineer of the Pittsburgh & Conneaut Dock Co., Conneaut, Ohio, died on December 11, 1920. Mr. Fickinger was born on January 12, 1858, in Girard, Pa. It was in Kingsville, Ohio, however, that Mr. Fickinger gained his elementary education, later receiving further mechanical training in Syracuse, N. Y.

P. J. FICKINGER

For four years he worked with the Phoenix Iron Works at Ashtabula, Ohio, leaving to become connected with the Straight Line Engine Co., Syracuse, N. Y., where he became closely associated with Prof. John E. Sweet, Past-president Am.Soc.M.E. Mr. Fickinger's entire business life was linked with the steel industry. Twenty years ago he assumed the position of master mechanic on the local docks in Conneaut. He became an authority on mechanics and advanced rapidly through the ranks till he became chief engineer of the Pittsburgh & Conneaut Dock Co. Mr. Fickinger was associated with George Hulett of Cleveland in the perfecting of the first automatic ore-unloading machinery, and at his death held an interest in the Hulett patents. He also held several patent rights in his own name.

Mr. Fickinger became a member of The American Society of Mechanical Engineers in 1888. He also belonged to several clubs and organizations in Conneaut and elsewhere, including the masonic fraternity.

ARCHIBALD STEVENSON McLUNDIE

Archibald S. McLundie, first lieutenant, Ordnance Department, U. S. Army, died on September 14, 1920, at Fox Hills Hospital, Staten Island, N. Y. Lieutenant McLundie was born in Glasgow, Scotland, in 1880, and obtained both his education and early experience in that city. His first connection in this country was with the Reliance Machine & Tool Co., St. Louis, Mo., from 1906 to 1907, as a designer of brickmaking machinery. Later he became associated with the Arnold Co., Chicago, where he remained until 1908. The following year he became engaged in the design and development of steam turbines for the E. W. Bliss Co., Brooklyn. From October 1911 to August 1912 he was connected with the Montague Mailing Machine Co. Chattanooga, Tenn., as machine designer. At that time he entered business for himself in that city as mechanical engineer and patent attorney.

Lieutenant McLundie served in the Ordnance Department of the U. S. Army throughout the war. At the time of his death he had not received his discharge but had been retained as mechanical draftsman for the Ordnance Department and was attached to an arsenal in New York. He had been cited to receive the Belgian War Medal for meritorious service in his particular line.

Lieutenant McLundie was a member of several Scottish societies and other fraternal organizations. He became a junior member of the A.S.M.E. in 1915.

CLEON EDGAR PHELPS

Cleon E. Phelps, plant engineer, the Allen Spool & Wood Turning Co., Mystic, Conn., died on December 16, 1920. Mr. Phelps was born in Leominster, Mass., in November 1889, and received his early education in the schools there. Later he attended Worcester Polytechnic Institute, from which he received his B.S. in 1913. From 1913 to 1915 he was connected with the American Steel & Wire Co., Worcester, Mass., his work there being of an experimental nature. From 1915 to 1917 he was with the American Optical Co., Southbridge, Mass., engaged in development work. The following year he became assistant director of the mechanical engineering shop laboratories of the University of Illinois, and served as a machine-gun instructor during the summer months. In 1918 Mr. Phelps entered the service as a second lieutenant in the Ordnance Department of the U. S. Army. He was located as a production officer of small arms at the Marlin-Rockwell plant in New Haven, Conn. Upon leaving the service in 1919 he became factory manager of the Embossograph Products Corporation, Salem, Mass.

Mr. Phelps became a junior member of the Society in 1914. He was also a member of the American Legion and of the American Ordnance Association and of several fraternal organizations.

RICHARD D. KIMBALL

Richard D. Kimball, president of the Richard D. Kimball Co., Boston, Mass., died on November 10, 1920, at Alton Bay, N. H., his summer home. Mr. Kimball was born on September 16, 1847, in Rochester, N. H. His first employment was with the Prentice knife shops in Greenfield. From 1881 to 1887 he was with the Millers Falls Tool Co., Millers Falls, Mass., as superintendent of the vise shop. While there he invented several attachments for the machines. In 1888 he located in Boston, being interested in a passenger-car heating system which he had invented and patented. Mr. Kimball was also for a short time New England representative for the Johnson Service Co. and in 1897 entered the heating and ventilating engineering business under his own name.

His first large piece of work was the central heating plant at Dartmouth College, which was followed by installations at Groton School, Mount Holyoke College, Wellesley College and many others. Mr. Kimball invented a conduit system of split tile for steam pipes which was patented in 1899 and later sold to the H. W. Johns-Manville Co. His business was incorporated in 1908 under the name of the Richard D. Kimball Co., and his engineering work extended from Canada to Georgia and Kentucky, and west to North Dakota.

Mr. Kimball was a member of the Boston City Club and of several church organizations. He became a member of The American Society of Mechanical Engineers in 1906.

WILLIAM H. SAYRE

William H. Sayre, president of the American Abrasive Metals Co., died suddenly at his home in Glen Ridge, N. J., on January 6 from a severe heart attack. Mr. Sayre was born at Mauch Chunk, Pa., in September, 1865. He was graduated from Lehigh University as a mechanical engineer in 1866. Beginning his practical experience in railroad building in the Northwest, in which he became associated with John B. McDonald, Mr. Sayre later became well known as president of the International Contracting Co., executing many important dredging contracts in New York and other harbors and being called upon to act as a consulting engineer on the Cape Cod Canal.

He was among the first to apply electric welding commercially, organizing the Federal and the Anthracite Electric Welding Companies. In the safety engineering field he was known for his development of the American Abrasive Metals Co., of which he was president until the time of his death.

Mr. Sayre was a member of the American Society of Safety Engineers and was instrumental in its successful reorganization. He became a member of The American Society of Mechanical Engineers in 1911 and served on its Boiler Code Committee, in which he was especially interested.

L. D. YORK

L. D. York, president of the Portsmouth Street Railroad and Light Company, Portsmouth, Ohio, died on September 19, 1920. Mr. York was born in England in 1847. He served an apprenticeship as roll turner in England and served also in that capacity in the Passaic Rolling Mills, Paterson, N. J., in 1869. From 1869 to 1889 he acted as superintendent in various rolling mills, his last connection being with the Burgess Steel and Iron Company. Mr. York joined the Society in 1889.

EMPLOYMENT SERVICE BULLETIN

Conducted by the Employment Service of The Federated American Engineering Societies, 29 West 39th Street, New York

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers: non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

INSTRUCTORS: All engineers willing to consider teaching positions are invited to register with the Employment Service Bureau of the Federated American Engineering Societies. This Service Bureau has been called upon to fill more positions, varying in grade from laboratory assistant to head of department in various engineering and technical schools of this country, than it has been able to do from among the men now registered. Blanks for the purpose of registration and information regarding the Bureau may be had by addressing W. V. Brown, Manager, 29 West 39th Street, New York, N. Y.

GRADUATED MECHANICAL ENGINEER WANTED, preferably with pulp and paper-mill experience for large Canadian sulphite mill. State age, experience, salary expected and enclose copies of references. Location Canada. Z-2627.

SALES ENGINEER. One familiar with boiler and furnace maintenance and operation, to handle line of furnace specialties in middle west. Salary and commission. Good opportunity. Write, giving experience, training, etc. Z-2664.

RECENT ENGINEERING GRADUATES for developing and using new testing machines for sheet metal. Some machine-shop or machine-design experience desirable, but not essential. Candidates are especially desired with extensive training in engineering physics and mathematics; desirable personality essential. Location Washington, D. C. X-3.

MECHANICAL ENGINEER for veneer-package plant, steam power-plant operation; electrical plant operation and maintenance; woodworking machine maintenance; planer-saws, veneer lathe and clipper, stapling machines, tenoner nailers. Location Ga. X-4.

CHIEF ENGINEER for steam plant. Some knowledge of electricity desirable. Also chief engineer for same plant. Location Conn. X-6.

SALES MANAGER and SALES ENGINEER. Electric heating appliance (especially for domestic cooking) experience desirable. Must have sales manager experience. Location Wisconsin. X-12.

MANAGER for manufacturing and selling machines for labeling cans. Desire man with some practical merchandising experience, and some substantial knowledge of production. Particularly interested in one with merchandising ability, and the knowledge of how to develop sales and dispose of such a product. Location New York. X-13.

MACHINERY SALESMAN, C.E. or M.E., about 30 years old, Protestant, single, preferably with some experience in construction work and also in sale of machinery in Eastern States. Must have agreeable personality, be steady and ambitious worker. Work will be largely helping agents with sales and promoting their interest in our lines. Headquarters probably New York office but perhaps at some other city in New York territory. Most of time probably spent away from headquarters. Location New York City or vicinity. Application by letter only. X-17.

ENGINEER with broad textile experience to write text book and conduct correspondence course in spinning and weaving. Application by letter only. Location New York City. X-18.

SALES EXPERT and SALES PROMOTION MAN with thorough experience in direct and magazine advertising, knowledge printing and electrotype requirement. Able to write "Peppy" copy. Send sample of work. Electrical experience desirable. Age 26 to 29, not over. X-23.

PLANT ENGINEER with technical training and capable of taking full charge of electrical heating, maintenance of buildings, as well as planning and erecting of all new buildings and installing machinery. Location Massachusetts. X-25.

MECHANICAL ENGINEER experienced in designing automatic feeds for power presses and conveyor systems. Experience in automatic machinery essential. Application by letter. Location Conn. X-28.

MECHANICAL ENGINEER to develop and improve labor-saving machinery. Location New York City. X-40.

ENGINEER experienced in die making and drawing of sheet metal and construction of sheet-metal machinery. Experience of foreman in sheet-metal shop manufacturing sheet-metal dies and special stamping machinery. Man between 35 and 45 preferred. Must also have production experience. Location Ia. X-49.

WORKS MANAGER or SUPERINTENDENT with experience in manufacture of water-tube boilers that will qualify him to take charge of production in factory; establish proper system for routing shop orders; see that they are properly carried out; that contracts are carried out to fullest extent possible, as far as work in factory is concerned. Location Illinois. X-50.

SALES MANAGER experienced in rubber tires. Application by letter only. Location New York City. X-51.

GENERAL PUBLIC SERVICE ENGINEER. Value experience. Primary; recent, extensive, detail work on garbage-reduction, sewers and highways. Secondary: street-railway construction and operation. Tertiary: water-supply, gas and electrical plant operation and cost, fire-protection, town-layout, housing, railroad terminals, concrete. Good technical education. A city manager might qualify. No salary limit except capacity of man. Location Michigan. X-57.

INSTRUCTOR IN DRAWING. Position open immediately. Location Ohio. X-61.

ASSISTANT to head of mechanical-engineering and steam power-plant departments, of our Extension Division. Preferably graduate from one of leading technical schools, with degree of M.E. Prefer one with both practical and teaching experience and qualified to act as assistant in preparation of lessons in various subjects connected with mechanical engineering, including shop practice. Location New York City. X-64.

YOUNG ENGINEER with executive ability with refrigerating or power-plant erecting experience. Good opportunity with young growing manufacturing concern in Newark, N. J. X-65.

ADVERTISING SOLICITOR. Young man must have had actual sales experience in railway-equipment field and know buyers. X-66.

HIGH-GRADE SALES ENGINEER. Must be live wire—one acquainted with power-house equipment. Salary and commission of from eight to ten thousand dollars a year. Prefer man between 30 and 40. No one will be considered whose past sales record does not prove him worth this amount. Position now open. Location Illinois. X-68.

MECHANICAL DRAFTSMAN: four or five years' experience on oil-refinery design, particular attention to be given to pipe lines, pump manifolds and still designs. Location New England States. X-75.

REFRIGERATING ENGINEER, young and energetic in estimating and sales-engineering department, with both theoretical and practical experience in special line of ice making and refrigerating machinery. Must be qualified to handle inquiries, estimate all engineering requirements pertaining thereto, prepare complete specifications and contract forms ready for purchaser with guarantees attached. Location Wisconsin. X-76.

CHIEF DRAFTSMAN, experienced in air compressors. Must understand theory of compressed air and be able to design. Steam-pump experience will be considered. Location Illinois. X-90.

GENERAL MANAGER, for concern manufacturing trailers. Capable of handling all details of this business. Location New Hampshire. X-97.

CHIEF OPERATING ENGINEER, for two power

houses. One plant consisting of five 350 hp. B. & W. boilers, one 1250 kw. Westinghouse turbine, one 300 kw. bleeder-type Westinghouse turbine, one 1250-hp. compound engine in our rolling mill. Other plant has eight 50-hp. h.r.t. boilers, one Westinghouse turbine, one De Laval and one Curtis turbine, running condensing, a 500-kw. motor-generator set and two single-cylinder Corliss engines direct-connected to rolls. Location Connecticut. X-102.

MECHANICAL ENGINEER for executive position with company manufacturing cereal beverages. Must be able to look after maintenance of plant such as boiler problems, etc. Good future. Location South. X-106.

SALESMEN with proper training to handle automobile merchandising intelligently. Commission basis. Men with initiative, strong personality and who have been more or less in direct contact with the buying public. Location New York City. X-111.

SALESMEN to place on market some tools of new design used in ship building and railroad industries. Company also about to open sales campaign to distribute high-speed steel, hardened by process recently discovered. X-115.

SUPERINTENDENT of machine shop making paper-mill and textile machinery. Must be thoroughly experienced in modern practice and good executive. American only. Prefer man 35–40 years. Location New England. X-118.

ENGINEER with considerable experience in industrial plant layout and design. Must have executive ability. Write fully, giving age, experience and salary expected. Location Middle West. X-127

ENGINEER who will take over one-third interest and assume entire management of company building coasters, carousels, toboggan sleds and equipment. Should not only be able to assume executive charge of business but should also have good mechanical ideas. Location Pennsylvania. X-138.

EXCELLENT OPPORTUNITY offered in Shanghai, China, for thoroughly experienced designing, erecting, power-plant engineer to handle well-known equipment for established export organization. Able to finance any installation. Willing to give responsible capable engineer good salary and opportunity to secure up to twenty thousand dollar interest partnership in firm. Only high-grade financially able man considered. Give detailed experience, references first letter. All confidential. X-142.

TWO EXECUTIVES. Directors of established concern manufacturing hardware line, screw-machine products and operating brass and aluminum foundry. Have opportunity for two experienced men. Manager to have full charge of business. Superintendent to have full charge of factory and foundry. Small investment required in each case to insure interest. Business located in large city near New York. In business over 20 year. X-146.

EXECUTIVE TREASURER, must be engineering or college graduate capable of taking complete charge of finances of engineering manufacturing corporation. High-class man with good connection willing to invest after examination. Location New York City. X-157.

AMBITIOUS YOUNG MEN, ten, for salesman's training course, with company manufacturing pumps. Must have vision enough to take full advantage of extensive shop and office training and must be capable of development into high grade representatives. Engineering degree required. Application by letter. X-165.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter; unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

MECHANICAL ENGINEERING GRADUATE, desires position in machine designing or testing. Practical experience: 8 months in large steel foundry; 6 months in design and standardization of conveying machinery; pilot in Air Service during war. Age 24, single. SM-5959.

CONSULTING ENGINEER, age 27. Six years' experience with power plant equipment and machine tools, as machinist, draftsman, production manager, mechanical engineer and chief engineer. Desires position with firm of industrial engineers. Present salary $2100. SM-5960.

MECHANICAL ENGINEER. Technical graduate; age 42; married. Twelve years in India. Industrial and technical instruction; building design and construction; executive. Available at present for U. S. A.; later for Orient. SM-5961.

MECHANICAL ENGINEER specializing in invention, research and machine design would like to work out mechanisms, machines or processes on salary, by contract or on contingent fee. SM-5962.

ASSISTANT TO WORKS MANAGER. Industrial and mechanical engineer now employed with old and reliable paper mill; technical education; age 33; 10 years with same company. Draftsman, chief draftsman, mill engineer; development engineer at present time. Development of methods to increase production, lower costs, and improve quality. Boston vicinity preferred. SM-5963.

SALES or EXPORT EXECUTIVE, age 37; married. Technical training, mechanical and electrical engineering. Five years' experience shop, drafting, construction; 7 years' sales engineering; 5 years' manager export house handling technical lines. Broad knowledge machinery and supplies. Initiative and organizing ability. Spanish. Would like to locate with manufacturer as sales or export manager. Location immaterial. SM-5964.

MECHANICAL ENGINEER, age 27, desires executive position, vicinity New York City. Preferably production work; 15 months' experience steam engineering work U.S.N.R.F., released as Lieutenant (j.g.). Have held positions as head of planning department and chief inspector. Salary $2500 year. SM-5965.

MECHANICAL ENGINEER, graduate Middle Western University. Present position, charge of production, steel purchasing, planning, estimating, all correspondence pertaining to production, drop forge plant. Desires executive or semi-executive position, not necessarily drop forging. Middle West or Coast preferred. Age 29; married. SM-5966.

MECHANICAL ENGINEER, college graduate, with twenty years' active experience in designing, producing and selling heavy machinery, desires position as chief engineer or general superintendent in charge of production. Capable of developing, manufacturing and selling a new product. SM-5967.

FACTORY SUPERINTENDENT and mechanical engineer. Fifteen years' experience in development and manufacture of typewriters and adding machines, along most modern lines. High-grade practical man with successful executive record. Best of references. Age 39. SM-5968.

SUPERINTENDENT or PRODUCTION MANAGER, technical graduate. Varied experience both in designing and manufacturing supervision. Have held positions where intensive and accurate production was essential. At present employed but desires change. Location immaterial. SM-5969.

POWER-PLANT ENGINEER, graduate, age 34. Ten years' experience in power-plant, estimating, design, construction and operation; also in detail design of all first-class prime movers; just returning from reconstruction work in Europe. Desires position as executive or mechanical expert in established consulting engineers office. Location immaterial; traveling no objection. Salary commensurate with responsibility. SM-5970.

INSTRUCTOR or ASSISTANT PROFESSOR of mechanical engineering. Technical graduate with 5 years' of shop, drafting room, research and teaching experience, desires position on faculty of engineering institution. Age 30; married. SM-5971.

MECHANICAL DESIGNING ENGINEER desires to form permanent connection with small manufacturing company in Middle West. Technical graduate with 14 years' in design, engineering, and administrative work. At present engineer of automotive accessories company. Particularly qualified to take responsible charge of engineering and experimental work and to work out revised designs to reduce manufacturing cost. SM-5972.

MECHANICAL ENGINEER, technical graduate, age 30; married; 8 years' experience in maintenance and plant layout, railroad motive power-department and non-ferrous rolling and seamless tube mills. SM-5973.

PRODUCTION SUPERINTENDENT, with many years' experience in modern management methods including Gantt and other systems. Desires change and permanent association with concern requiring such a man. SM-5974.

INDUSTRIAL ENGINEER. Graduate; with training in organization and management, planning and time study, cost finding, factory layout and equipment, machine-shop practice. One year in textile industry; two years in army as Captain of engineers; one year with nationally known arms and ammunition plant. Age 28; married. Desires position with progressive industry or firm of industrial engineers. SM-5975.

MECHANICAL ENGINEER, age 25; single. Eight and one-half years' experience on design, construction and inspection of various large industrial developments from design to operation, *viz.*, steam power plants, brass rolling mills and manufacturing plants, etc. Mechanical and structural. Capable of assuming responsibility. Will locate anywhere or travel. SM-5976.

FACTORY SUPERINTENDENT and mechanical engineer, age 45, wants change. Twenty-five years' successful experience as foreman and general superintendent in large middle west and eastern plants manufacturing high-grade machinery and fine tool equipments. A-1 record and references from past and present employers. At present superintendent of Pacific Coast plant. SM-5977.

MECHANICAL SUPERINTENDENT, with broad training and experience in engineering, construction, maintenance and extensive plant improvements. Strong and economic executive with proven ability to organize and get results. Excellent clientele among men of broad caliber. Age 33; American; good health. SM-5978.

FACTORY MANAGER or INDUSTRIAL ENGINEER, age 42; married. Seventeen years' experience handling production in various lines, in charge of organizations varying from 100 to 3000 men, filling positions ranging from shop foreman to manager. Familiar with safety work, fire protection, and modern employment management. Highest references. SM-5979.

MECHANICAL ENGINEER, age 34; married. University graduate. Ten years' R. R. experience in maintenance construction, operation, power plants, water, coal and ash handling, etc. Four years' experience in selling, designing, constructing, and contracting on power plants and water supplies and in selling power-plant equipment. Present salary $6000. Desires connection which promises chance for future. SM-5980.

STEEL MILL ENGINEER, technical graduate, age 31, American. Nine years' experience in rolling mill, blast furnaces, and coke plants as foreman, assistant steam engineer, erecter of power houses and master mechanic. Present position master mechanic of large by-product coke plant. Desires work as coke-plant master mechanic, mechanical engineer or assistant chief engineer of steel mill or connection with consulting engineer in allied lines. Location immaterial. Salary $5000. SM-5981.

GRADUATE MECHANICAL ENGINEER, age 30, single. Five years' experience; 2 years in the Mid-Continent oil fields, as mechanical engineer for gas department of prominent oil company. Experience covered testing of gas engines, vacuum pumps, and meters, casinghead gas for gasoline content, efficient utilization of gas on leases, etc. Desires position in oil fields. SM-5982.

MECHANICAL and ELECTRICAL graduate with three years' experience in mechanical line. SM-5983.

MECHANICAL ENGINEER or assistant, age 25. Technical graduate. Desires position with future. Four years' practical experience in various capacities. Draftsman and designer; factory maintenance, production. SM-5984.

MAINTENANCE ENGINEER, over 20 years' experience in steel works, as construction and maintenance engineer. Specialties: open hearth, crucible, heating and annealing furnaces, rolling mills and hydraulic presses. SM-5985.

MECHANICAL ENGINEER, plant executive, age 34. At present mechanical superintendent for modern chemical plant; 10 years' experience in design, construction and maintenance work; 3 years' experience in sales office with company manufacturing heavy machinery; familiar with mining and general heavy equipment. Desires connection with manufacturing plant. SM-5986.

MASTER MECHANIC or plant engineer, American, age 32. Ten years' experience in design, installation, maintenance and successful handling of labor. Salary $5000. SM-5987.

EXECUTIVE ENGINEER. Technically trained electrical mechanical engineer; 15 years' experience in design, construction, manufacture and operation. Accustomed to handling proposition in its entirety from design to operation including executive, technical, cost and accounting features. Present salary about $500. Open to permanent engagement with an organization having future. SM-5988.

MECHANICAL and LICENSED STRUCTURAL

ENGINEER, age 44, technical graduate. Position in charge of factory planning, construction and maintenance. Can plan and write operations in manufacture, design and erect plant and install machinery; 13 years' experience. SM-5989.

TOOL DESIGNER, desires connection with company, preferably of New York City or Connecticut vicinity, who can use first-class, fast man. Now employed as assistant chief draftsman and in charge of planning department. Married; American. SM-5990.

COMMERCIAL ENGINEER, age 32, member International Engineering Societies. Foreign trade. Possess exceptional commercial knowledge, initiative and foreign-trade technique in addition varied technical experience embracing shop work, inspection and supervision important government contracts, purchase and sales large quantities mechanical equipment. Desire permanent connection with progressive concern where proven ability will be recognized. SM-5991.

ENGINEER and SALESMAN, 11 years' experience applying and selling power and engineering apparatus, will give up responsible salaried position to represent on commission manufacturer who appreciates need of forceful representation under changing business conditions. Location Cleveland. Personal contact throughout Michigan, Ohio and Western Pennsylvania. SM-5992.

ASSISTANT TO EXECUTIVE. Technically educated; age 34; 12 years' varied manufacturing and business experience from shopman to direct; production, sales, administration and conduct of corporate affairs. Knowledge of accounting, taxes and contracts. Desires position as assistant to general officer or one requiring wide range of work and responsibility. Location in or near New York City. SM-5993.

MECHANICAL ENGINEER, experienced in industrial plant design, construction and maintenance development of rolling-mill equipment, furnace and combustion problems; steam-boiler operation and central-station steam heating. Technical graduate, age 29. Qualified for position as work's engineer. SM-5994.

PRESSED-STEEL ESTIMATOR. Young married man, employed, desires change. Prefer position with small growing concern. Location Detroit or East. Prefer sales or production end. Have two years' technical training, drafting, shop layout and three years' estimating experience on medium and heavy stampings. SM-5995.

SALES ENGINEER, age 38, would like to connect with progressive company having need of engineer with wide clientele and business experience. SM-5996.

MECHANICAL ENGINEER and executive, age 40; single; Stevens graduate. Railroad apprenticeship; 19 years' experience, installation and operation fuel oil; organization personnel and methods to reduce power-plant waste. Speaks French, Spanish and Portuguese. Prefer service Spain or South America. Available April. Present salary $5000. SM-5997.

GRADUATE MECHANICAL ENGINEER (1920) desires connection with heating, ventilating or power-plant designing firm. Have had ventilating experience and want position with responsibility. Location in East. SM-5998.

WORKS MANAGER. High-grade executive desires to sell his services; 15 years' experience as general superintendent and works manager, on products such as electrical goods, brass novelties, automobile parts, ball bearings, valves and fittings. Thoroughly familiar with modern factory methods and at present successfully engaged as works manager. Desires to connect with manufacturer. SM-5999.

SALES ENGINEER, M.E. Columbia; age 32; married. Ten years' engineering and sales experience, last two as district manager. Excellent record as producer. Desires position of responsibility with manufacturer of machinery or mechanical equipment. Headquarters New York City. SM-6000.

MECHANICAL ENGINEER, age 28; married. Eight and one-half years shop practice, tool designing, safety and equipment engineering, plant layout, plant and manufacturing equipment maintenance. Boiler room tests and efficiency records of same. Can efficiently handle men. Salary $3600–4000. Location anywhere in U. S. SM-6001.

SALES ENGINEER, age 33; mechanical, technical graduate. Experienced in engineering and sale of machine tools and factory equipment, elevating and conveying machinery, forge-shop machinery, furnaces, and oil burners. Prefer Middle West territory. SM-6002.

MECHANICAL ENGINEER, technical graduate, 1915. Age 26. Considerable executive experience; also shop experience, including drafting. Desires connection with manufacturing or industrial concern where future is unlimited, and where opportunities are shared with men who help make them. East preferred, but not essential. SM-6003.

INDUSTRIAL ENGINEER, graduate of M. I. T. 1918 in Engineering Administration; age 24; three years' general and industrial engineering experience. Desires permanent location in vicinity of Boston or is willing to travel with Boston as base. Now located in Southwest, but can be available in one week. SM-6004.

MECHANICAL ENGINEER, age 27; five years' John Hopkins University engineering and business economics (Evenings). Four years' apprentice in shop and drawing room; 3 years' designer of automatic and electrical machinery; 3 years foreman of rolling mill, organization and production work; 3 years' designer piping arrangements and marine engines. Possesses executive ability, capable of directing responsible work in manufacturing, construction and designing. SM-6005.

PLANT ENGINEER, energetic, tactful, resourceful, Twelve years' experience in design, installation, upkeep and repair of machinery, power generation, distribution, and application. Lowering costs, increasing output, improving quality. Organization and labor control. Paper making and allied preferred. Location Eastern Massachusetts. SM-6006.

ORGANIZER, with 22 years' varied experience including management, sales, export, engineering, systems, shop maintenance, etc. Unquestionable references from former connection. Have successfully operated extensive enterprise; can demonstrate ability to grasp situations and produce results. Interview sought. SM-6007.

FACTORY or GENERAL MANAGER, graduate engineer; 12 years' engineering and management experience; available as manager of industrial plant of about 250 employees. Salary $7500. SM-6008.

MECHANICAL ENGINEER, age 38; married; 18 years' experience in steam engineering, reciprocating machinery and unaflow engines, as draftsman, designer, consulting engineer, inventor. At present employed but desires suitable permanent position, preferably steam engineering, research or experimental. Excellent record and references. Resourceful, capable taking charge. East preferred. SM-6009.

SOUTHERN MAN, age 35; married, 13 years' experience with world's largest builders of heavy machinery as engineer, construction man, district sales manager, advertising manager and assistant sales manager. Present salary $7200. Anxious to relocate south in sales capacity as district manager or commission basis. Highest qualifications and letters from big executives of industry. SM-6010.

DREDGING SUPERINTENDENT. Civil and mechanical engineer with 15 years' experience as executive in charge of all classes of dredging, submarine rock removal, steam shovel and drag-line work. Competent to assume full charge of projects of magnitude involving any class of excavation. Now in Orient but will be in New York in March. Will consider either foreign or domestic proposition. Minimum salary $6000. SM-6011.

ASSISTANT WORKS ENGINEER, technical graduate with over a year's experience in above work desires to make change. Fully capable of assisting in construction and maintenance of industrial plants, design and installation of equipment. Fine ability to direct operations. Location East, near Connecticut, if possible. SM-6012.

MECHANICAL ENGINEER and DESIGNER, age 39. Technical graduate with 19 years' broad manufacturing experience, machine and tool design, purchasing, automatic and special machinery, production supervision on small interchangeable parts. Competent to take charge of engineering department. Brooklyn, N. Y., preferred. Available at once. SM-6013.

HIGHLY TRAINED MECHANICAL EXECUTIVE, desires position requiring broad-gage man. Twenty years' manufacturing experience, acquired as toolroom foreman, general supervisor of equipment, general superintendent, works manager, assistant general manager and general manager. Successful record as executive. Familiar and in sympathy with best shop methods. Will gladly furnish detail of experience with references. SM-6014.

MECHANICAL ENGINEER, technical graduate, age 27, would like to utilize spare time for drafting, designing or tutoring on technical subjects anywhere in New York City. Has ability to develop inventions. At present located as assistant chief engineer of corporation. SM-6015.

MECHANICAL and AUTOMOTIVE EXECUTIVE of wide experience, wishes to change from position where he is not so much underpaid as unhappy. Has handled big things and knows how to manufacture. Can organize and direct; accustomed to large responsibilities but will be glad to serve as assistant. Salary not a major consideration. SM-6016.

ELECTRICAL ENGINEER, technical graduate, 1914, thoroughly experienced in high- and low-tension generation, transmission and distribution engineering. Also experienced in steam power-plant design and construction. Health excellent. Desires active and responsible position. At present employed. Salary $3600. SM-6017.

TECHNICAL GRADUATE, age 30; married; 9 years' practical experience in the steel industry. Would like to enter sales or order department of steel company. Initial salary immaterial if prospects of future advancement are good. Philadelphia or vicinity preferred. SM-6018.

MECHANICAL ENGINEER. Technical graduate; age 28; single. Two years' experience designing automatic machinery as assistant chief draftsman and two years as assistant mechanical engineer. Desires position of responsibility, with opportunities for advancement. SM-6019.

SALES ENGINEER. Graduate textile engineer; age 29; married. At present employed. Four years' experience in engineering; 2 years Captain Coast Artillery. Wants position selling high-grade product in New England. SM-6020.

ENGINEER. Two years' practical civil engineering; 4 years' mechanical and electrical university course; 14 years' general engineering, experience including design and construction work, also installation of oil refining machinery; industrial plant machinery; boiler house and power plant machinery, and large steel plant machine tools with electrical equipment; steam, air and water piping incident thereto. Thoroughly practical with executive ability. No objection to foreign service, providing salary is commensurate with position and location. Minimum United States $5000. At present employed. SM-6021.

MECHANICAL ENGINEER and power plant executive at present retained in charge of plants of large concern desires to utilize available time in similar capacity near or in Chicago. Technical graduate; married; excellent references. SM-6022.

GENERAL or WORKS MANAGER. Mechanical and electrical engineer, 15 years' executive industrial experience in management, finance, sales, factory organization and quantity production. Can handle old established or develop new manufacturing propositions from raw material to the marketing of the finished product. SM-6023.

PRODUCTION ENGINEER, Superintendent or sales engineer; American; age 43; married. Large experience covering manufacture, management and sales. Would like to make connection with live growing concern. First-class references. SM-6024.

PLANT ENGINEER or MASTER MECHANIC. Graduate engineer; age 30; 7 years' experience general construction and plant maintenance, covering dredging, dock work, factory construction, quarry operation and maintenance, power house and general chemical plant maintenance, etc. Desires permanent position where action and ability to handle men are required. SM-6025.

MECHANICAL ENGINEER, technical graduate, age 36; married; 11 years practical experience; drafting, designing, layout, field, sprinkles systems; public utility operation and maintenance; industrial plant construction; chemical apparatus and plants; also teaching experience. Desires position with engineering concern or industrial plant. Vicinity New York preferred. SM-6026.

ASSISTANT WORKS or PRODUCTION MANAGER. Age 30, experienced in manufacture of heavy machinery and boilers. Exceptional experience and references. Prefer vicinity of New York or New Jersey. SM-6027.

SALES ENGINEER or CHIEF ENGINEER. Technical graduate, age 27. Capable of developing new lines of pressed steel stampings to replace castings and forgings. Will assume full responsibility for engineering and tool design for manufacture of same. Experienced on estimating and costs. SM-6028.

CHIEF DRAFTSMAN, assistant chief engineer, desires to locate with progressive company; also experienced as specialist in design and operation of high- and low-pressure air and gas compressors. Tactful and capable of directing engineering department. SM-6029.

GRADUATE ENGINEER. Over 15 years' experience in engineering excutive and managerial positions, on highest grade work. Wishes change, preferably to medium-sized, profitable concern of recognized standing. Age 38. Minimum salary $5000. At present employed. SM-6030.

MECHANICAL and POWER ENGINEER. Technical graduate; 12½ years' practical engineering and manufacturing experience; plant layout construction, maintenance and operation of power

and equipment; boiler, engine efficiencies and economies. Heating, ventilating, piping, designing, construction and installation. Designing tools, fixtures, machinery. Equipment specifications and purchase. Capable of responsible charge engineering and maintenance departments. SM-6031.

YOUNG MAN, age 28; technical education; 7 years' experience with all grades of steels and their heat treatment. Member American Society for Steel Treating. SM-6032.

MECHANICAL ENGINEER, graduate, age 29. Extensive executive ability, last position as assistant chief engineer in large oil corporation. Experience in oil refinery construction and design, including design of pumping stations and transmission pipe lines. Competent to handle engineering forces. Available immediately for either domestic or foreign proposition. SM-6033.

MANAGER, mechanical engineer; age 35; director of sales, general and business engineering, construction, purchasing, appraisal layout and design of power plants, equipment and complete manufacturing plants. Personal sales of equipment over $4,000,000. SM-6034.

YOUNG MECHANICAL ENGINEER, age 28; married. Desires to make change because of unsettled condition of the automotive industries. Ten years' general manufacturing experience as tool and manufacturing engineer; has just completed a job in Middle West where he had complete charge of jig and fixture design, operation planning and machine-tool purchases on a large new plant recently completed. SM-6035.

MECHANICAL ENGINEER, technical graduate; single; 6 years' experience in machine and tool construction and testing; also 4 years' in design of power plants, oil and mechanical equipment. Desires to enter sales engineering. Preferred location New York City. SM-6036.

GRADUATE MECHANICAL ENGINEER, wishes position as estimator or mechanical engineer. Three years' experience in construction, design and valuation work. SM-6037.

MECHANICAL ENGINEER, graduate, age 26; 5 years' experience in drafting room, including design of oil engines, gas holders and gas apparatus, and locomotives. One year in shop. Construction work or position promising construction work later on desired. Best references. SM-6038.

MECHANICAL ENGINEER, age 28; married; technical education; 8 years' broad engineering experience including design of fertilizer, sulphuric acid, sugar and steam power plants. Chemical, conveying and transmission machinery. Supervision of men. Would take charge of drafting department. Sales engineer position considered. New York City or vicinity. SM-6039.

ASSISTANT PRODUCTION ENGINEER; 4 years' practical experience; 5 years as executive. Specialized on planning, estimating, processing and control on small parts quantity production. Desires position with possibilities for the future. Age 31. Available immediately. Location immaterial. SM-6040.

MECHANICAL ENGINEER, 14 years' experience in factory maintenance, machine and tool design and industrial engineering. Successful record as master mechanic, chief draftsman, chief engineer and production engineer. Desires connection with progressive concern as chief draftsman or production engineer. Location immaterial. SM-6041.

PLANT LAYOUT and MECHANICAL EQUIPMENT DRAFTSMAN. Inspecting sales and telephone experience. Location South. SM-6042.

CONSTRUCTION ENGINEER. Graduate M E who has just finished big industrial plant is available for further work. Can furnish whole organization if required. SM-6043.

MECHANICAL ENGINEER, Columbia graduate, age 31; married. Ten years' experience in design installation, inspection and test of power plant, heating and ventilating equipment, design and development of special equipment for freight handling; 3 years' in responsible charge of engineering office of inspectors, draftsmen, engineers and clerks. Location desired, N. Y. City or vicinity. SM-6044.

SALES ENGINEER and MANAGER, for some of the biggest American manufacturers and exporters of steel and machinery during 8 years' residence in the Far East, giving unusual opportunities of studying conditions and knowing t e consumers and importers there. Wishes to make a connection that will permit of residence in U. S. SM-6045.

SALES, ESTIMATING or DEVELOPMENT WORK. Graduate mechanical engineer, 1916, age 26. Well equipped to produce results where combination of executive, analytical, and engineering ability is required. Experience as engineer of methods, research engineer, crane, electric furnace and equipment estimator, and materials engineer. A.H.I. student. SM-6046.

INDUSTRIAL ENGINEER opening desired in production control, development or experimental work, time study, accounting, costs. Over 5 years' experience in these lines. Would be interested in opportunity to develop with policies and methods of an individual firm. Graduate in both mechanical engineering and economics. SM-6047.

SUPERINTENDENT and PRODUCTION ENGINEER, practical and technical with 19 years' machine shop, drafting room, tool designing, production and executive experience, desires responsible position. SM-6048.

ENGINEER, 18 years' successful experience in design, manufacture and sale of alternating and direct current motors. Qualified to assume entire charge of business or will accept position as factory manager, sales or district sales manager. Age 40; American. Available March 1. SM-6049.

ENGINEER EXECUTIVE, university graduate, electrical mechanical; sound business training; construction, sales and purchasing experience. Until recently in charge of exports New York office of well-known foreign house of contractors, merchants, managers. Good knowledge domestic industry and foreign conditions. Age 33; married. Good references. SM-6050.

YOUNG MECHANICAL and ELECTRICAL ENGINEER, with 1½ years' experience in industrial and power plant work, desires connection with industrial power plant, construction or general consulting concern. Training largely executive. SM-6051.

ENGINEERING or MANUFACTURING EXECUTIVE. Age 31, M.E. graduate. Two years in charge of establishing processes and ordering equipment for shops employing 2000 men; 5 years' experience in economical production of tools and special machines; 2 years in retail merchandising. Familar with functional systems of work control, and plant layout and rearrangement work. SM-6052.

INDUSTRIAL and POWER PLANT ENGINEER. Technical graduate; 12 years' experience. Can handle men, money and materials efficiently. Wide experience in combustion and efficiency problems. Location immaterial. Speaks fluently French, Italian and German. SM-6053.

MECHANICAL and CIVIL ENGINEER. At present in charge of engineering and purchasing for oil company; has had experience with design and construction of industrial plants, office and mill buildings, and factory layouts. Age 40; college graduate; best of references. SM-6054.

MECHANICAL ENGINEER, age 40. At present assistant to department head. Experienced on design of industrial plants with special and standard equipment cost estimates, specifications, analysis of bids and recommendations for purchase. Past 7 years' work on plants in South America has given knowledge of export and import conditions. Prefer New York. SM-6055.

MECHANICAL ENGINEER, CHIEF ENGINEER, MASTER MECHANIC. Technical graduate, 12 years' experience. Capable of taking complete charge of engineering and construction. Specialist on combustion, power plant development, furnace design and low temperature carbonization processes. Excellent man for consulting engineer. Location preferred, New York City. SM-6056.

MECHANICAL ENGINEER, age 32, technical graduate, with 10 years' experience on mill and power plant construction with engineers and contractors, desires business position where a man with engineering training is required. Salary desired $300. SM-6057.

TECHNICAL GRADUATE, age 30; M.E. degree. 8 years' experience in buying and selling mechanical equipment for export and domestic trade. Desires position as technical buyer for manufacturing interests, public utilities or exporters. Salary $3500. SM-6058.

GENERAL or FACTORY MANAGER, age 38; 20 years' experience, mechanic, designer, producer, organizer. Machine tools, automobiles, milling cutters, small tools. SM-6059.

GRADUATE MECHANICAL ENGINEER; 3 years' shop experience and 3½ years' of drafting and designing, would like an executive position wherein the above training and experience will be an asset. Location in the East. SM-6060.

FACTORY EXECUTIVE, age 36; married; 20 years' practical experience as apprentice machinist, traveling erector, inspector and superintendent; assistant in charge of cost accounting office, installation of cost systems, cost analysis, and statistical reports. Salary commensurate with responsibilities. New York or New Jersey Metropolitan section preferred. SM-6061.

ASSISTANT TO WORKS MANAGER or similar executive. Mechanical engineering graduate, age 30; married. One year executive experience; 2 years' of machine design, plant layout and production work; 1½ years' machine shop. Desires place of larger responsibility and opportunity. Employed. References. Salary $3000. SM-6062.

DEVELOPMENT and PATENT ENGINEER; 10 years' experience in development and patent protection of complicated mechanisms. Practical machine shop and designing experience. Can take charge of experimental work and make intelligent study of difficult patent situations. SM-6063.

MECHANICAL ENGINEER. 3½ years' experience in design, construction and maintenance of industrial plants and equipment. Desires responsible position as assistant chief draftsman or assistant mechanical engineer. Technical and practical training. SM-6064.

PRODUCTION ENGINEER. 1917 graduate in Electrical Engineering, Univ. of Illinois; D. Sc. aeronautical engineering, M.I.T. 1½ year airplane design; also experience in plant layout and purchase of equipment machinery and as technical supervisor for quality production. Desires mechanical engineering work leading to management for improvement of product and machinery. SM-6065.

MEMBER, age 35, Annapolis graduate. Thirteen years' engineering executive experience in U. S. Navy and industry, including two years war service commanding war vessels in Asiatic waters. Experienced in operation, installation and maintenance of ships, buildings, power plants, shops, conveyors, refrigeration, etc. Have successfully directed efforts of more than 1000 persons. Since return in July, 1919, have engaged in selling engineering specialties. Broad experience, well suited to work of master mechanic, sales engineer or district manager. Location in America of no consequence. Salary, $6,000. SM-6066.

TOOLING and PRODUCTION ENGINEER. Specializing for six years with full responsibility for results, in mass production of duplicate parts by tooling, routing of work and re-design of product. Two years general factory engineering in rubber and paper manufacture. Age 32. Reliable references. SM-6067.

ENGINEER EXECUTIVE, age 34. Practical engineer with both civil and mechanical and business experience. Available March 15. Wishes connection with production, export or domestic sales organization on Pacific coast or New York section. An organizer with engineering, production, sales and advertising experience. Salary $3600. SM-6068.

CAPTAIN ORDNANCE DEPARTMENT, U. S. A., honorably discharged, with 37 years' experience in design and construction of machinery, power plants, industrial buildings, textile factories and chemical plants; expert in heating and ventilating. Available on drawing board and in field. SM-6069.

MANUFACTURING EXECUTIVE. Expert on cost and production control problems. Twelve years' practical experience including re-organizing and systematizing of industries. Have also supervised process inspection, plant layout, employment, welfare, and safety engineering. Familiar with tools, machine tools, iron and brass foundries, boiler-shop and tube mill. Age 32. SM-6070.

DESIGNING ENGINEER. Several years designing experience on instruments, apparatus of all kinds, machinery, engines, etc., open for spare-time work. Reasonable rates. SM-6071.

MANAGER-GENERAL SUPERINTENDENT, age 41. Graduate mechanical engineer with practical shop and draughting experience, thoroughly versed in modern manufacturing methods, production, costs and control, also pattern shop and foundry practice. Capable of handling large number of men. SM-6072.

MECHANICAL ENGINEER, experienced in electrical testing and construction, and design construction and maintenance of power plants, mills and factories. Desires position as chief draftsman, chief or departmental engineer, or works maintenance engineer. Trained also in accounting, and experienced in engineering business office work. Age 46; references furnished. SM-6073.

WORKS MANAGER or superintendent with 18 years' practical manufacturing experince; 3 years' industrial engineer, installing cost, production and office methods; 4 years' works manager; 6 years' foreman and superintendent. Thoroughly familiar with principles of modern manufacturing methods. Experienced cost accountant and certified traffic manager. Now employed as industrial engineer, but desire permanent connection with growing progressive concern. American, age 40; perfect health. Available May 1. SM-6074.

GRADUATE MECHANICAL ENGINEER with 4½ years' assistant construction and building superintendent. Capable of handling men in all building trades, ordering and specifying materials; 3

years designing mechanical plant layouts, structural steel, reinforced concrete details, piping, heating and ventilation. References furnished. Salary $350. SM-6075.

MECHANICAL ENGINEER, technical graduate, age 28; married. Desires to locate with growing industrial plant; 4 years' experience with large manufacturing plant and two years as first Lieut. Corps Engineers. Best of references. SM-6076.

MECHANICAL ENGINEER, technical graduate; 10 years' experience as teacher of experimental and mechanical engineering; designer and assistant engineer on gas engines, tractors, and mill machinery. Desires permanent position as chief draftsman, assistant engineer or similar position. SM-6077.

ELECTRICAL MECHANICAL ENGINEER, age 27, technical graduate. Four years' experience in plant engineer in large and small mills. Good executive. Location immaterial. Wishes position in small factory, or in construction work. SM-6078.

ENGINEER, age 31, broad training and experience on marine engine, boiler, ordnance and general machinery along technical practical branches. Demonstrated ability in direction of design and production. Experienced executive. Single; Canadian. Go anywhere. Has been abroad. Salary $2800. SM-6079.

SUPERINTENDENT with broad experience in manufacturing and production methods; 25 years' manufacturing high-grade machinery, small tools, guns, twist drills and steel balls. Ability and experience in devising methods and means for interchangeable quantity production at low cost. Experienced from workman up to general superintendent of plants of 300. Now open for engagement. SM-6080.

DRAFTSMAN, automatic machine, tool and fixture designer. Desires position of responsibility with progressive concern. Age 26, American. Highest references. Vicinity, Newark, N. J., preferred. SM-6081.

MECHANICAL ENGINEER. Technical graduate; has had complete charge of designing, layouts, calculating and testing of power plant and ship propulsion auxiliaries, heating, ventilating and compressed-air systems. Thoroughly acquainted with fuel-oil burning. At present employed as assistant chief engineer of large industrial organization. Desires position vicinity of New York. Age 26. SM-6082.

TECHNICAL MAN with 12 years' experience in engineering, as designer, and in administrative capacity. Familiar with light automatic and heavy machinery, power-plant design and equipment. University training in engineering, business economics and finance, thoroughly competent. Must have employment at once. SM-6083.

MECHANICAL ENGINEER, age 28; four years' experience in drafting, designing, machine shop and construction work; 15 months in army. Desires position of responsibility. Philadelphia or vicinity preferred, but not essential. SM-6084.

MECHANICAL ENGINEER, M.E degree, ex-naval officer, age 25. Fourteen months with large oil company, nine months of this time in Cuba. Desires position with export house with opportunity to learn office end of business while studying banking at night with view to being sent to Mexico, Central or South America. Available March 15. SM-6085.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER MARCH 12, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically.

Unless objection is made to any of the candidates by Mar. 12, 1921, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

HARD, HERBERT G., Mechanical Draftsman, Chickasaw Shipbuilding & Car Co., Chickasaw
HASSLER, JOHN M., Plant Engineer Semet Solvay Co., Ensley
LAMPROS, GEORGE, Chickasaw Shipbuilding & Car Co., Chickasaw

California

AVERY, ALBERT R., Holt Manufacturing Co., Stockton
DUPERU, ALPHONSE M., Plant Manager, California & Hawaiian Sugar Refining Co., Crockett
HOUSTON, ALBERT J. R., Palo Alto
McGINTY, NEAL L., Supervising Engineer, Royal Indemnity Co., San Francisco
PEASE, ROBERT M., Machine Shop Foreman, Axelson Machine Co., Los Angeles
TAYS, EUGENE, Mechanical Engineer, Wallace Refineries, Taft
VAIL, HAROLD P., Mechanical Engineer, Layne & Bowler Corpn., Los Angeles

Connecticut

ANDERSON, JOHN F., Elevator Inspector, Hartford Accident and Indemnity Co., Hartford
ANDERSON, ORVAR F., Demonstrator, Pratt & Whitney Co., Hartford
BIRD, JEWETT D., Electrical Designer, Chase Co., Inc., Waterbury
EMERY, ALBERT H. JR., Assistant to A. H. Emery, Glenbrook
MARKS, WADE G., Executive Training Course, Winchester Repeating Arms Co., New Haven
MAYOTT, CLARENCE W., Assistant Superintendent of Power, Hartford Electric Light Co., Hartford
MOGENSEN, MOGENS J., Foreman, The Acme Wire Co., New Haven
PALMER, HARRY G., Master Mechanic, A. B. Hendryx Co., New Haven
RAPHAEL, REGINALD, Process Engineer, Winchester Repeating Arms Co., New Haven
ROBY, SHELDON S., Draftsman, New Britain Machine Co., New Britain
SALVO, LORENZO C., Bridgeport
ZAVARINE, IGOR N., Metallographist, Winchester Repeating Arms Co., New Haven

Delaware

DUNCAN, GEORGE W., Power Engineer, Hercules Powder Co., Wilmington

District of Columbia

CROOK, LOUIS H., Instructor in Mechanics, Catholic University of America, Washington
MILLER, MICHAEL E., Chief Mechanical Engineer, Construction Service, Washington
ROGERS, JOHN L., Mechanical Engineer, Interstate Commerce Commission, Washington
WINGARD, TODD A., Technical Expert, Army Ordnance Department, Washington

Florida

FISHER, DEWITT, Mechanical Engineer, The Phosphate Mining Co., Nichols

Georgia

LAMONT, ROBERT, Assistant Industrial Engineer, Fulton Bag & Cotton Mills, Atlanta

Illinois

ALLERTON, OSCAR J., Industrial Engineer, L. V. Estes Inc., Chicago
CHAMBERS, WILLIAM R., Assistant Chief Engineer, American Steel Foundries, Chicago
MUELLER, ROBERT H., Chief Engineer, H. Mueller Manufacturing Co., Decatur
THOMPSON, CHARLES S., Chief Engineer, Union Special Machine Co., Chicago

Indiana

JOHNSON, GUSTAVE F., Machine Designer, Stevenson Gear Co., Indianapolis

Iowa

BORG, ELMER H., Mechanical Engineer, Proudfoot, Bird & Rawson, Des Moines
LANDES, BATES F., Mechanical Engineer, Proudfoot, Bird & Rawson, Des Moines

Kansas

HULING, THURMAN H., Master Mechanic, Ash Grove Line & Portland Cement Co., Chanute

Maryland

QUARLES, FRANK W., Test Engineer, Consolidated Gas & Electric Co. of Baltimore, Baltimore
WEARN, GOBER E., Sales & Commercial Engineer, Westinghouse Electric & Manufacturing Co., Baltimore

Massachusetts

CLEVETTE, CHARLES F., Mechanical Draftsman, United States Arsenal, Watertown
DOANE, ALFRED O., Division Engineer, Metropolitan District Commission, Water Division, Boston
FITTZ, RAYMOND U., Instructor in Mechanical Engineering, Tufts College, Medford, 57
HUGHES, EARL C., Assistant to Sales Engineer, Norton Co., Worcester
JOHNSON, CLARENCE N., General Engineer, Westinghouse Electric & Manufacturing Co., Boston
MILEHAM, RAYMOND S., Assistant Plant Engineer, Greenfield Tap & Die Corpn., Greenfield
O'HARA, ELIOT, Manager, O'Hara Waltham Co., Waltham
ROCKWOOD, HARRY J., Department Engineer, Worthington Pump & Machinery Corpn., East Cambridge
SHAW, CHARLES H., Student Engineer, Worthington Pump and Machinery Corpn., Holyoke
STEARNS, WILBUR A., Master Mechanic, Massachusetts Cotton Mills, Lowell
WOODWARD, ALBERT L., Rate Setter, Morgan Construction Co., Worcester

Michigan

BULKLEY, LEAVITT J., Sales Engineer, Northern Engineering Works, Detroit
CROCKER, SABIN, Piping Engineer, The Detroit Edison Co., Detroit
HANSON, KAI E., Tool & Die Designer, Burroughs Adding Machine Co., Detroit
MUDGE, ROYAL B., Supervisor, Engineering & Inspection, Hayes Wheel Co., Jackson
SCOTT, JAMES D., Chief Inspector, C. H. Wills Co., Marysville

Minnesota

ASHENDEN, ERNEST W., William Bros. Boiler and Manufacturing Co., Minneapolis

Missouri

CORBY, JEROME B., President and Treasurer, Corby Supply Co., St. Louis
HADLEY, STANTON A., District Manager, McIntosh & Seymour Corpn., Kansas City
HAGER, J. FRED, Fulton Iron Works, St. Louis
McCARTHY, JOHN W., Engineer, Union Electric Light & Power Co., St. Louis
MEYERS, ARTHUR C., Head of Engineering Department, The Brecht Co., St. Louis
ORMSBY, ERLE, Vice-President and General Manager, Merchants Ice and Coal Co., St. Louis
RITSCHY, LEWIS J., Engineer of Power Plant, Monsanto Chemical Works, St. Louis

Montana

THERKELSEN, ERIC, University of Montana, Bozeman

Nebraska

MORRIS, EVAN R., Omaha

New Jersey

BAKER, GEORGE C., Assistant to Superintendent of Erection, Babcock & Wilcox Co., Bayonne
CANFIELD, GEORGE W., Mechanical Investigator, Weston Electrical Instrument Co., Newark
DEVRIES, JOHN, Owner and Manager, Novelty Iron Works, Passaic
FULLER, JOSEPH C., Manager, Dane Molding Co., Inc., Newark
MACK, EDWIN H., Draftsman, Ingersoll-Rand Co., Phillipsburg
SCHAUFELBERGER, CHARLES J., Foreman, Weston Electrical Instrument Co., Newark

New York

ANTHONY, LAMONT W., Brooklyn
ASH, PRENTICE D., Brooklyn
BENNISON, W. T., Assistant Mechanical Engineer, Locomotive Feed Water Heater Co., New York
CARROLL, JOHN S., Director and General Manager, Oil Industry Department, Johns-Manville, Inc., New York
CONLEY, WILLIAM J., Instructor, University of Rochester, Rochester
DAVIDSON, PHILIP L., Sales Engineer, Carrier Engineering Corpn., New York
DURAND, WILLIAM L., Heating and Ventilating Engineer, Clark, MacMullen & Riley, New York
EELLS, HENRY B., JR., Junior Engineer, Miller, Franklin, Bassett & Co., New York
EGGERT, LOUIS H., Industrial Engineer, Brooklyn

FISHER, EDWARD H., Job Superintendent, Morse Dry Dock Co., Brooklyn
GIBBS, CHARLES R., General Superintendent, Ryther & Pringle Co., Carthage
GOVE, LEWIS P., Engineer, Ingersoll-Rand Co., New York
HALL, LESTER C., Melchior, Armstrong & Dessau, Inc., New York
HEINZMANN, WILLY M., Chief Tool Designer, American Eveready Works, Long Island City
JACKSON, GEORGE P., Assistant Engineer, Combustion Engineering Corpn., New York
JONES, MARSHALL T., United States Steel Products Co., New York
JORDAN, HARRY W., Chemical Engineer, Semet-Solvay Co., Syracuse
KARES, EDWARD H., Assistant Purchasing Agent, The J. G. White Engineering Corpn., New York
KNEEZEL, HARRY C., Assistant Superintendent, Rock Plaster Corpn., New York
KNOX, STUART K., Associate Member of Firm, Hill & Ferguson, New York
MURRAY, THOMAS E., JR., President, Metropolitan Engineering Co., Brooklyn
MYERS, ROBERT D., Kirkman & Son, Brooklyn
RENNO, PAUL C., Railroad Representative, Niles, Bement Pond Co., New York
ROSSNAGEL, W. ELWOOD, Draftsman Thomas E. Murray, inc., New York
RUIZ, OSCAR H., Draftsman, Kennedy & Van Saun Manufacturing & Engine Co., New York
SEATON, EDWARD J., Turbine and Gear Expert, United States Shipping Board, New York
SLEACO, HERBERT C., Brooklyn
SMITH, ROBERT J., Mechanical Engineer, Ford, Bacon & Davis, New York
STINSMAN, WALTER F., Engineer and Salesman, Dodge Sales & Engineering Co., New York
TIMPSON, THOMAS W., Mechanical Engineer, Ford, Bacon & Davis, New York
WEISEL, CHARLES H., Mechanical Engineer, Traffic Department, The Texas Co., New York
WILLIAMSON, JOHN L., District Manager and Sales Engineer, J. O. Ross Engineering Corpn., Rochester
WYLD, ROBERT H., New York Sales Manager, Power Specialty Co., New York
ZYCHLINSKI, LECH W. S., Sales Engineer, Worthington Pump & Machinery Co., New York

North Carolina

SMITH, HAROLD B., Draftsman, Atlantic Coast Line Railroad, Wilmington

North Dakota

CHOATE, DAVIE C., Instructor, University of North Dakota, Grand Forks

Ohio

BOEGEHOLD, ALFRED L., Metallurgist, General Motors Research Corpn., Dayton
CRUM, HOLLIS B., Designer, Hadfield-Penfield Steel Co., Bucyrus
HENDRICKSON, NIELS E., Chief Engineer, The Mather Spring Co., Toledo
HORN, SILAS H., Mechanical Engineer, Bunting Brass & Bronze Co., Toledo
HOURWICH, ISKANDER, Aeronautical Mechanical Engineer, Engineering Division, United States Army, Air Service, McCook Field, Dayton
JOHNSON ALFRED, Manager, Atlas Chemical Co., Toledo
MALTHANER, WILLIAM, Superintendent of Motive Power, Baltimore and Ohio Railroad Lines West, Cincinnati
MILLER, ROBIN L., Production Engineer, The Huber Manufacturing Co., Marion
MITERMILER, ANDREW S., Assistant to Zinc Engineer, The Grasseli Chemical Co., Cleveland
MOODEY, ALBERT W., Automotive Engineer, Sherwin Williams Co., Cleveland
PAINE, WALTER T., Sales Engineer, Hooven, Owens, Rentschler Co., Hamilton
REEVES, CLIFTON, Industrial Engineer, The Willys-Overland Co., (Reinstatement), Toledo
TOWNSEND, JOHN E., Mechanical Draftsman, Berger Manufacturing Co., Canton

Oklahoma

SIBOLE, BARTON P., Superintendent, Motor Transport Department, Sinclair Oil & Gas Co., Tulsa

Pennsylvania

BEAUMONT, ROBERT H., President, R. H. Beaumont Co., Philadelphia
BILGER, JOHN N., Midvale Steel & Ordnance Co., Nicetown, Philadelphia
BIRCH, HERBERT E., Sales Manager, R. H. Beaumont Co., Philadelphia
BYERSON, CHARLES E., Chief Draftsman, Railway Steel-Spring Co., Latrobe
COLE, AMOS G., Engineer of Plant, Standard Steel Works Co., Burnham
ELWELL, G. RANDOLPH, Construction Engineer, Standard Sanitary Manufacturing Co., Pittsburgh
FRANCE, A. WARREN, President, France Packing Co., Tacony, Philadelphia
FRINGER, D. L. BARTLETT, Chief Draftsman, American Steel Foundries, Chester
GREENWELL, NEVIL, Engineer, Patent Department, Bethlehem Steel Co., Bethlehem
GRISWOLD, GEORGE D., Mechanical Engineering Department, American Bridge Co., Ambridge
HANN, HOWARD J., Assistant to Superintendent, Pennsylvania Power & Light Co., Milton
HOWELL, CHARLES M., Teacher in Engineering, Swarthmore College, Swarthmore
KRAUS, RUDOLF, Mechanical Engineer, Aluminum Seal Co., New Kensington
LEATHERS, HARRY R., Assistant Engineer, Marine Engineering Division, Westinghouse Electric & Manufacturing Co., Lester
MCCALL, DONALD G., Ordnance Designer, Ammunition Division, Ordnance Department, Bethlehem Steel Co., Bethlehem
MCELFRESH, HENRY E., Assistant to Research Engineer, Frankford Arsenal, Philadelphia
MAULL, WILLIAM R., Engineer, Dilland Collins Co., Philadelphia
MILLER, EARL J., Bethlehem Steel Co., Bethlehem
SPELT, GEORGE S., JR., Secretary, Quaker City Iron Works, Philadelphia
STARR, BENJAMIN F., 3rd, Designer, Oil Well Supply Co., Oil City
WEST, DONALD A., Draftsman, Cambria Steel Co., Johnstown

Rhode Island

JAMIESON, ROBERT I., Secretary, Screw Machine Products Corpn., Providence

Utah

ERICKSON, JOHN P., Combustion Engineer, The Commercial Engineering Co., Salt Lake City

Virginia

LEE, RANDOLPH H., Inspector, Plant Engineer's Office, Newport News Shipbuilding & Dry Dock Co., Newport News

West Virginia

LETCHFIELD, FRANCIS T., Industrial Engineer, Charleston Industrial Corpn., Nitro
WHITESIDE, JOHN WALTER, General Superintendent, White Sulphur Springs, Inc., White Sulphur Springs

Wisconsin

ALDEN, LEON V., Assistant to Superintendent, National Brake & Electric Co., Milwaukee
HOWARD, ROBERT V., Mechanical Engineer, Power Plant Construction Division, The Milwaukee Electric Railway and Light Co., Milwaukee
SERCOMBE, ROBERT J., Master Mechanic, Globe Seamless Steel Tubes Co., Milwaukee
THUERMANN, WILFRED J., Tool & Gauge Engineer, A. O. Smith Corpn., Milwaukee

Canada

CRANE, HAROLD C., Student, University of Toronto, Toronto, Ont.

China

NONAKA, HIDEJI, Mechanical Engineer, South Manchuria Railway Co., Dairen

Cuba

DWINELL, CHARLES A., Consulting Engineer, The Baldwin Locomotive Works, Havana

England

SOUTHERN, GILBERT W., Engineer, Steel, Peech & Tozer, Ltd., Sheffield

Japan

IGARASHI, GENTARO, Superintendent of Electrical Steam Power Station, Yokohama Electric Co., Ltd., Yokohama
SHIROTA, TOA, General Sales Engineer, Engineering Department, American Trading Co., Tokyo

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

New York

DALLEY, A. H. CHARLES, Consulting Engineer, Locomotive Superheater Co., New York

Pennsylvania

NESDAHL, EILERT, Chief Engineer, Atmospheric Conditioning Corpn., Philadelphia

Washington

WILLETTE, CHARLES W., Chief Engineer, Milling Department, Puget Sound Machinery Depot, Seattle

PROMOTION FROM ASSOCIATE-MEMBER

Illinois

KELLY, ROY C., Assistant to Chief Engineer, R. & V. Motor Co., East Moline

Massachusetts

SIBLEY, EDWARD W., Mechanical Engineer, Aberthaw Construction Co., Boston

Ohio

BULLEIT, ORA L., Barnes Manufacturing Co., Mansfield
CLAPP, RICHARD B., District Manager, Andrews-Bradshaw Co., Cleveland

Oklahoma

JOHNSON, CHARLES M., Designing Engineer, Williams Petroleum Engineering Corpn., Oklahoma City

PROMOTION FROM JUNIOR

Illinois

KRATZ, ALONZO P., Research Assistant Professor, Department of Mechanical Engineering, University of Illinois, Urbana

Iowa

LOONEY, JULIAN L., Mechanical Engineer and Factory Superintendent, Globe Machinery & Supply Co., Des Moines

Massachusetts

FOLEY, LEONARD H., Engineer, Stone & Webster, Inc., Boston
NORRIS, EDWARD W., Mechanical Engineer, C. B. Roberts Engineering Co., Boston

Michigan

CROCKER, ARTHUR G., Sales Engineer, Westinghouse Electric & Manufacturing Co., Detroit
SINGLETON, ARTHUR B., Manager, Power Equipment Department, Kerr Machinery Corpn., Detroit

Minnesota

ENGELKING, W. W., Machine Designer, Clyde Iron Works, Duluth

New York

AUSTIN, RICHARD S., Sales Engineer, Wheeler Condenser & Engineering Co., New York
LACAZETTE, ALFRED A., Construction Engineer, West India Oil Co., New York
MENZL, LEON, 1st Assistant to Mr. Samuel Vickess, New York
MUELLER, VICTOR H., Designing Engineer, Henry L. Doherty & Co., New York
WHITE, J. W. HUYLER, Construction Engineer, American Sugar Refining Co., Brooklyn

Ohio

BROWN, AUBREY I., Assistant Professor of Steam Engineering, Ohio State University, Columbus
CLARK, WILLIAM F., Mechanical Engineer, B. F. Goodrich Co., Akron
ELMENDORF, HAROLD H., Production Manager, Aultman Taylor Machine Co., Mansfield
THOMAS, FRED H., Vice-President, The C. & G. Cooper Co., Mount Vernon

Pennsylvania

AMBROSE, ROY B., Teacher, Carnegie Institute of Technology, Pittsburgh
TERZIAN, HARUTYUN G., Engineering Staff, Department of Tests, United Gas Improvement Co., Philadelphia

Texas

WESTERFIELD, GEORGE S., Engineer and Manufacturers' Agents, Houston

Virginia

SERBELL, CARL V., Chief Engineer and Mechanical Superintendent, Portsmouth Cotton Oil Refining Corpn., Portsmouth

Canada

BUNKER, RAYMOND U., Consulting Engineer, Atlantic Sugars, Ltd., St. John, N. B.

South America

DASSO, DAVID, Managing Director, Vulcan Iron Works, Callao, Peru

SUMMARY

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Change of Grading:	
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Promotion from Junior	22
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In Two Sections—Section Two

MECHANICAL ENGINEERING

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A.S.M.E. AFFAIRS

Volume 43 April, 1921 Number 4

HERRESHOFF MADE HONORARY MEMBER

New Committee Appointments Confirmed at Syracuse Meeting of A.S.M.E. Council

For the second time the Council enjoyed the opportunity of meeting with the American Engineering Council, the regular February meeting being held in Syracuse, N. Y., on the fifteenth.

President Carman was unable to be in attendance, being on a trip to the western Local Sections, and Vice-President Alford presided in his absence. There were present: Managers D. S. Kimball, F. O. Wells and H. M. Norris; Past-Presidents I. N. Hollis and F. J. Miller; Chairmen of Standing Committees R. V. Wright, Meetings and Program Committee, and Wm. H. Kenerson, Local Sections Committee; Secretary, Calvin W. Rice. The guests were Messrs. James W. Herron and Chas. Penrose of the Committee on Local Sections.

The account of the meeting of American Engineering Council was published in the March issue of MECHANICAL ENGINEERING.

Society Honors Naval Architect

Honorary Membership. On unanimous decision of the Council, Nathaniel Greene Herreshoff, naval architect and engineer, was elected to Honorary Membership in the Society. The honor will probably be conferred upon Mr. Herreshoff at the Spring Meeting.

Spring Meeting, 1921. On the recommendation of the Committee on Meetings and Program the Army Ordnance Association was invited to participate in the visit to Rock Island Arsenal which is to be made by the Society on the occasion of the Spring Meeting in May.

Progress of the Committees

Nominating Committee. A special resolution requesting the Committee on Local Sections to report back to the Council a method of allocating members to Local Sections for the purpose of selecting representatives for the regular Nominating Committee, was passed.

Boiler Code. Interpretation No. 333 was approved and ordered printed as usual.

Power Test Codes. The presentation of the Test Code for Reciprocating Steam Engines was authorized to be made to the Society at the Spring Meeting. Mr. E. H. Brown, was approved on the Committee preparing a Test Code for Steam Turbines.

Standardization. On the recommendation of the Standardization Committee Messrs. F. F. Beall, J. J. Boax, Earl H. Browning, Earle Buckingham, Maynard D. Church, John P. Kotteamp and Arthur M. Laycock were approved on the American Engineering Standards Committee on Standardization of Gears, a joint committee with the American Gear Manufacturers' Association.

Mr. Willard T. Hatch was approved on the

(Continued on page 42)

SOUTHERN SECTIONS TO CONVENE AT MOBILE

Council to be Guest of Atlanta, Birmingham and New Orleans Sections

A regional meeting of more than usual interest will be held at Mobile, Ala., April 22. Three Southern Sections are joining hands to make this meeting noteworthy and the Council of the Society has voted to accept an invitation to attend in a body. The regular April meeting of the Council will be held at Mobile and the Committee on Local Sections will also be present. It is hoped, therefore, that all members of the Society located in the southeastern part of the United States will take advantage of this opportunity to participate in a regional meeting and at the same time meet the officers of the Society. The Council is holding its meetings in cities in different parts of the country, at a great sacrifice of the time and energy of the busy men who make up its personnel. The purpose of these visits is to emphasize the national character of the Society and to give all members a better opportunity to see the Council in action. Its meetings are open and all members are welcome.

The program includes morning and evening professional sessions, a visit to the shipyard and power plant at Chickasaw Point, and dinner at the Battle House, the headquarters.

The Committee in charge of arrangements for the meeting consists of Earl F. Scott, Candler Bldg., Atlanta, Ga.; F. G. Cutler, 2551 Pike Ave., Ensley, Ala.; and E. W. Carr, Jr., 425 Gravier St., New Orleans, La.

STRONG TEXITLE PROGRAM AT PROVIDENCE APRIL 12

A joint meeting of the Providence and Textile Sections of the Society will be held April 12 at Providence. Headquarters will be at the rooms of the Providence Engineering Society and the sessions will be held in Memorial Hall in the afternoon and evening. Morning trips have been arranged to the Silver Springs Bleachery, Apponaug Company, and the Universal Winding Company. Papers are to be presented on The Art of Winding as Related to the Textile Industry, by George W. Foster; The Effect of the Variable-Speed Motor on the Heat Balance in the Finishing Plant, by Warren B. Lewis; The Microscopy of Textiles, by Fred Hoxie; Waste Due to Lack of Standardization in the Manufacture of Fabrics, by William O. Lichtner, consulting engineer; and Fabric Defects from the Finisher's Standpoint, by H. L. Whiteley.

SPRING MEETING

McCook Field, Dayton, May 21

Congress Hotel, Chicago, May 23-26

Rock Island Arsenal, May 27-28

Reserve the Dates!

SPRING MEETING EVENTS STAGED FOR 3 CITIES

Trips to McCook Field and Rock Island Arsenal Will Vary Chicago Sessions

The 1921 Spring Meeting of the Society will have many noteworthy events. It will open at McCook Field, Dayton, Ohio, on March 21, where the S.A.E. and the Aeronautic Section of the A.S.M.E. will meet jointly to inspect the Field. Following the main meeting at Chicago an excursion will be made to Rock Island Arsenal with the Ordnance Section. Friday morning will be devoted to a trip through the Arsenal, with a technical meeting in the afternoon, and Saturday morning will be given over to a golf tournament on the Arsenal course. The Ordnance Department is coöperating fully in the Rock Island program. The local Tri-Cities Section will have charge of the arrangements during the sojourn at the Arsenal.

Sessions at Chicago

The meeting proper will be held at Chicago, May 23–26. The plans for the sessions, under the auspices of the various Professional Sections, are well under way and a program of value is assured.

The Forest Products group promises an interesting program of miscellaneous papers on the subjects in their field which were not covered at the Annual Meeting in New York.

The Fuel Section will consider as its main subject the Burning of Mid-Western Fuels. An excursion is planned to Milwaukee to visit the new installation of the powdered-coal plant of the Milwaukee Electric Railway and Light Company.

The Machine Shop Section is devoting its program to the consideration of the Effect of the Automotive Industry upon Machine-Tool Design and Machine-Shop Practice. Papers are in process of preparation to cover this subject.

Industrial Waste

The Management Section will have a program made up of three papers and a report of the Joint Committee on Management Terminology. The papers are as follows:

Industrial Waste, L. W. Wallace.
Graphics in Management, A. H. Burnett.
Organization of an Engineering Society, M. L. Cooke.

The Materials Handling Section will devote its time to the treatment of the problem of Design and Construction of Machinery for Road Building. Four papers are planned which will treat the problem from the point of view of the contractor, the road builder and possible future development of mechanical equipment in road building. Instead of excursions a number of very interesting films are being arranged for.

The Power Section has made tentative plans to discuss the subject of Power Resources and Development in the Middle West.

The subject of the Railroad Session will be the Design of Large Freight Locomotives. This is to be presented in three parts: First, Problems Arising from the Operation of Large Freight Locomotives, by N. H. Haig, Mechanical Engineer, A. T. & S. F. Railroad; second, The Construction of Large Freight Locomotives, by H. W. Sneider, of the Lima Locomotive Works; third, The Advantages of Large Freight Locomotives, particularly the 2–10–2 type, by an author to be assigned later.

SOCIETY'S GROWTH BRINGS NEW PROBLEMS

In this issue is published the annual synopsis of the personnel of the committees for the current year. Please preserve this copy for future reference. This synopsis gives no indication of the large number of other members who are working for the Society through the committee organization. There are at the present time over 600 members having committee assignments.

Not only that, but with the almost daily growth of some of the activities, such as the Local Sections and the Professional Sections, our "organization tree" is continually developing new branches and foliage. This would not be so serious if the addition of the new branches did not appear to take some strength from some of the old and useful branches, so that as the tree develops through its various forms it becomes somewhat difficult for the members to form an adequate picture of what it looks like.

This is one of the problems before the Society—in fact, before any organization of such a size as ours: to maintain its activities constantly visualized in the minds of every member so that every one feels that he belongs to an organization with definite purposes and not to an aggregation of individuals and committees with little specific direction.

When space permits, we hope to publish in MECHANICAL ENGINEERING a chart of the Society's activities.

HERRESHOFF MADE HONORARY MEMBER

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Committee on Safety Code for Ladders; Mr. J. Alfred Svensson was approved on the Committee on Safety Code for Machine Tools; and Mr. William Collins, was approved on the Committee on Safety Code for Floor Openings, Railings and Toeboards—all sectional committees of the American Engineering Standards Committee.

Biographies Committee. Biography of John E. Sweet. On the recommendation of Vice-President Alford, Messrs. E. N. Trump, Chairman, F. A. Halsey, Albert W. Smith, Ambrose Swasey and F. G. Tallman were appointed as a committee to prepare a biography of Honorary Member and Past-President John E. Sweet.

CALVIN W. RICE, *Secretary.*

U. E. S. ISSUES REPORT OF 1920 ACTIVITIES

Brief reports of the United Engineering Society have recently been issued by J. Vipond Davies, president, and Dr. Joseph Struthers, treasurer. These reports cover all the functions of the United Engineering Society and give brief outlines of the activities centered in the Society, namely, the Engineering Societies Library, Engineering Council, Engineering Societies Employment Bureau and Engineering Foundation. Copies of the complete reports may be secured upon application to the Society headquarters.

RULES ADOPTED FOR PROFESSIONAL SECTIONS ACTIVITIES

Standing Committee Action Provides for Affiliate Membership

Important rules for the guidance of Professional Sections were adopted at a meeting of the Standing Committee on Professional Sections held in New York on March 8.

The rules were presented by Mr. Robert M. Gates, Chairman of the Materials Handling Section and Chairman of the Committee on Rules. They embodied the existing By-Laws of the Society and supplemented them with additional rules on affiliates, organization, election of executive committee and on meetings and programs.

The Committee on Affiliate Membership, Mr. Selby Haar, Chairman, presented a tentative form of application for affiliates of the Professional Sections, together with a form of membership card for affiliates. These were adopted and will be put into effect immediately. The fee for affiliates is $10 a year; each affiliate receives a subscription to MECHANICAL ENGINEERING.

The individual Professional Sections submitted reports of their operations and of their prospects for the 1921 Spring Meeting in Chicago. The Aeronautic Section announced a trip to McCook Field on the day before the Spring Meeting.

The petition of 143 members for the formation of a Forest Products Section was approved and referred to the Council of the Society. The petition was presented by Messrs. Thomas D. Perry, Charles E. Paul, Grant B. Shipley, Robert B. Wolf and Carle M. Bigelow.

New Professional Sections on Power Transmission, on Lubrication and on Safety were discussed.

The registration in the sections to date was given as follows:

Aeronautics	300
Cement	121
Fuels	633
Gas Power	366
Machine Shop	762
Management	1313
Materials Handling	695
Ordnance	266
Power	1209
Railroads	369
Textiles	281
Total	6315

Prof. L. P. Breckenridge, Chairman of the Fuels Section, was elected vice-chairman of the Standing Committee.

The members of the Standing Committee are expected to meet with the Committee on Meetings and Program of the Society the first week in May to discuss plans for the professional sessions of the 1921 Annual Meeting of the Society.

POWER TRANSMISSION SECTION PROPOSED

Last year, shortly after the new professional sections were authorized, the writer attempted to arouse interest in a section on the Mechanical Transmission of Power. Approximately one hundred men have indicated their desire for such a section. A petition was submitted and the Committee on Professional Sections were of the opinion that the proposed section came within the scope of the present Machine Shop Practice Section.

It is the opinion of the writer and of a number of men with whom he has talked that important

(Continued on page 43)

THE SECRETARY'S LETTER

Nation's Need of Engineers Emphasized in Address at West Point

Upon the invitation of a committee from West Point Military Academy, your Secretary recently addressed the teaching staff and officers of that institution, telling of the movement of the engineering profession of America to organize and devote itself to public service.

Naturally, he first made every effort to get Mr. Hoover himself, the President of the F.A.E.S., to make so important an address—even previous to his telephone conversation with St. Augustine—but Mr. Hoover had every minute engaged for several weeks.

The whole nation is in greater need than at any previous time for the kind of leadership and clear thinking that Mr. Hoover exemplifies, and nothing could be more important than that West Point, which inspires and thrills every citizen of the United States, should get the spirit of the Federation and a knowledge of the possibilities which this movement has in store.

It is inconceivable to your Secretary how any engineer can fail to ally himself with this movement, and to put the emphasis of all his thought and action upon its consummation at the earliest possible time.

Engineers in Public Office

In this reconstruction period, not only of the United States but of the entire world, the high ideals and special training of the engineer should be in evidence. This is not to say that those who have no special fitness should immediately jump in, but that we should try to persuade those who have ideals, brains and experience to take public office, and then should hold up their hands.

The late Alfred Noble, former president of the American Society of Civil Engineers and at one time a member of our Council, prepared a most carefully balanced recommendation to the New York State Legislature that men of character and with an engineering training should be appointed to high positions requiring technical skill, placing emphasis on ability in administrative work and on judgment, but leaving it to be inferred that we should never make the error of appointing a man simply because he is an engineer.

Nothing could be more inspiring to the engineers than that such an outstanding representative of their profession as Mr. Hoover, who has these remarkable qualities of judgment and clear thinking, combined with engineering skill, should be nominated for membership in the Cabinet. His already announced devotion of himself to public service now gives him the opportunity to express himself not only in his individual capacity for the good of the nation, but through the Department of Commerce to express the ideals of the United States in every part of the world.

The Ideal of Service

The engineer is a typical ambassador and an advance agent in every good work—he pushes forward civilization. And it is incumbent on every engineer to again consecrate himself to the ideals of the Federation:

> "As service to others is the expression of the highest motive to which men respond and as duty to contribute to the public welfare demands the best efforts men can put forth, now therefore, the engineering and allied technical societies of the United States of America, through the formation of The Federated American Engineering Societies, realize a long-cherished ideal—a comprehensive organization dedicated to the service of the community, state and nation."

Just before the war, your Secretary received a call from Mr. Nicholas P. Melnikoff, Mem.Am. Soc.M.E., at that time personal technical adviser of the Czar of Russia, and assisted him in his mission to the United States to obtain technical information on many subjects. He learned with great satisfaction that Peter the Great had as his personal friend and adviser an engineer, in much

the same way as the President of the United States has a physician as his companion on tours. The companion of Peter the Great, it is understood, had a rank corresponding to that of a high officer, and it is fair to presume that this representative of the engineering profession added his share to the greatness of the illustrious Peter.

CALVIN W. RICE,
Secretary.

POWER TRANSMISSION SECTION PROPOSED

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advantages will arise from a separate section on Power Transmission. It is our thought that this section should include such subjects as shafting, pulleys, belts, sprockets, chains, gears, clutches, rope drives, power cut-offs, line and countershaft bearings, and hydraulic and air transmissions; broadly speaking, all methods and appliances for the mechanical transmission of power.

The object of such a section would be to develop interest and to encourage articles concerning these subjects. It might well work with the present standardization committees, such as those dealing with a safety code for the mechanical transmission of power, shafting, and ball bearings. Undoubtedly it would bring up further subjects for investigation and committee work.

It is asked that all members interested in this work send their names to the writer, care of The Fafnir Bearing Co., New Britain, Conn.

R. W. SELLEW, *Joun. Am. Soc. M.E.*
New Britain, Conn.

PRIZES FOR TECHNICAL PAPERS

Three cash prizes derived from the income of funds established by a member of the Society, are awarded annually for papers submitted, one by a Junior member of the Society, and two by enrolled Student Branch members. These papers must be submitted to the Society by June 30 for awards to be made at the Annual Meeting in December. Papers to be eligible for competition must have been produced by their authors without assistance and must not have been previously contributed to nor published by any other society or technical publication in whole or in part. Presentation before a meeting of, or publication by, this Society or by any of its Student Branches during the year of the competition, shall not be construed as making a paper ineligible. Further rules governing the distribution of these prizes may be obtained upon application to the Secretary of the Society.

Recent Section Meetings

Atlanta. February 25. Joint meeting with the local branch of the A.I.E.E. Subject: Rainfall for Hydro-Electric Plants, by C. G. Adsit, of the Georgia Railway & Power Co.

March 22. Meeting was held at Carnegie Library, Atlanta, Ga.

Baltimore. February 15. Subject: The Development of a Mine in the Tropics, by Edwin C. Holden, of the Davison Chemical Co., Curtis Bay, Md.

March 22. Subject: Time Study and Motion Study as Fundamental Factors in Planning and Control, by Frank B. Gilbreth, of Montclair, N. J.

Boston. February 17. Joint meeting with Boston Sections A.I.E.E. and A.S.C.E. Discussion of the bill before the Senate of the Commonwealth of Massachusetts providing for the registration of professional engineers and land surveyors.

March 2. Subject: Welded Steel Pipe from the Ore to the Finished Product, by H. T. Miller, commercial engineer, National Tube Co. Address accompanied by moving pictures of the process of the manufacture of steel pipe; film loaned by National Tube Co.

Chicago. February 21. Joint meeting with Western Society of Engineers. Subject: Air Conditioning, by J. E. Bolling, Carrier Engineering Corp., New York City.

March 4. President Carman addressed the meeting on The Activities of the National Society. Moving pictures of the Process of the Manufacture of Genuine Wrought-Iron Pipe.

Cleveland. March 1. Subject: Power Plant Evolution, by C. F. Hirshfeld, Detroit Edison Co., Detroit.

Colorado. March 25. At the Metropole Hotel, Denver, Colo.

Connecticut State:

Bridgeport. March 17. Subject: The Metric Fallacy, by F. W. Halsey.

Hartford. March 14. At the New Britain Club, New Britain, Conn.

March 18. Subject: Modern Illuminating, by C. H. Stickney, Edison Lamp Works, Harrison, N. J.

New Haven. February 23. Subject: Manufacture of Magnet Wire and Coils, by Charles R. Underhill, consulting engineer, Lampson Lyceum, Yale University. Motion pictures from the factory of the Acme Wire Co.

Eastern New York. February 25. Subject: Cross-Country Transportation and Its Present Application in the Military Service, by Col. L. B. Moody, U. S. Ordnance Dept., Washington, D. C.

Lehigh Valley. February 24. Subject: Super-Power and the Industries of the Lehigh Valley, by Harold Goodwin, Jr., of New York City.

Metropolitan. March 4. Port Newark Meeting. General account of meeting will be found in Section One.

March 25. Joint meeting with the A.I.E.E. Subject: Industrial Relations. Professor Walter Rautenstrauch was in charge of the meeting.

Milwaukee. February 16. Subject: The Superiority of the American Hydraulic Turbines, by Arnold Pfau, of the Allis Chalmers Mfg. Co. Illustrations of recent trips to Japan and Europe were shown.

Ontario. March 4. Subject: Aluminum, Its Manufacture and Uses, by Ralph M. Ferry, Superintendent of the Northern Aluminum Co., Ltd.

Philadelphia. February 28. The Engineering Aspects of Signaling, by A. H. Rudd, chief signal engineer Penn. R. R., Philadelphia, Pa.; Crane Overhoist Limit Stops, by D. M. Petty, E.E., Bethlehem Steel Co., Bethlehem, Pa.; The Relation of Boiler Accessories to Safety, by Warren Hilleary, Superintendent of schedule rating, Royal Indemnity Insurance Co., N. Y. C.; The Lubrication of Air Compressors, By Dr. A. D. Risteen, The Travelers Insurance Co., Hartford, Conn.; Lessons from Electrical Fatalities, by S. E. Whiting, Liberty Mutual Insurance Co., Boston, Mass.; A Broader Field for the Engineer, by Dean Dexter S. Kimball, Cornell University, Ithaca, N. Y.; Safety and Engineering Efficiency, by L. A. DeBois, of the E. I. du Pont de Nemours Co.

March 22. Joint meeting of engineering societies of Philadelphia. Subject: How an Engineer Can Best Capitalize Himself, by Richard Spillane, financial editor of Philadelphia *Public Ledger*.

Pittsburgh. February 25. Joint meeting with the A.I.E.E. Subject: Description of Details Involved in the Building of a Modern Locomotive, by E. C. Peirce, Manager, Pittsburgh Office, Baldwin Locomotive Works. Moving pictures of the Philadelphia and Eddystone plants of the company were shown.

Rochester. February 9. Joint meeting at luncheon with the Rochester Chamber of Commerce, Rochester Engineering Society and Local A.S.M.E., addressed by Frank M. Williams and Murray Hulbert.

February 23. Second joint meeting addressed by C. P. Craig, of Duluth, Dr. R. S. MacElwee, Director Bureau of Foreign and Domestic

Coming Section Meetings

Atlanta-Birmingham-New Orleans.

April 22. At Battle House, Mobile, Ala. Joint meeting with Atlanta, Birmingham and New Orleans Sections, with the members of the Council participating.

Colorado.

April 29. At the Metropole Hotel.

Columbus.

April 8. At the Engineers' Club. Subject: Combustion and Boiler Operation, by E. G. Bailey, of the Bailey Meter Co., Cleveland, Ohio.

Connecticut State.

Hartford.

April 11. At the City Club. Subject: The Corrosion of Metal Surfaces. Joint meeting with the Connecticut Valley Section of the American Chemical Society. Members of all National Societies are invited.

Meriden.

April 15. Subject: Electric Furnaces, by H. A. Winne, of the General Electric Co., Schenectady, N. Y.

Metropolitan (New York City).

April 22. Joint meeting with the A.I.E.E. Subject: Engineering Education. Professor Comfort A. Adams in charge of meeting.

Mid-Continent (Tulsa, Okla.).

April 28 and 29. Joint meeting of Chemical and Engineering Societies.

Philadelphia.

April 1. Students' Night: Speakers, Wm. D. Disston, Hugo Bilgram, C. N. Lauer, W. C. L. Eglin and J. G. Strachan.

April 26. Subject: The Spirit of Management, an Attitude of Mind, by Edward G. Budd.

Tri-Cities.

April 14. At the Chamber of Commerce, Clinton, Iowa. Subject: Woodwork, by Sern Madsen, of the Curtis Co., Inc.

Commerce, and Hon. Henry I. Harriman, Vice-Chairman of the Mass. Comm. on Foreign and Domestic Commerce.

Spokane. February 4. Organization meeting. Moving picture Coal is King was shown.

February 21. President E. S. Carman spoke on The Engineer and His Opportunity.

March 18. At the Davenport Hotel, Spokane, Wash.

Toledo. March 17. Subject: Distilled Boiler Feed Water, by George R. Lyons, Power Equipment Co.

Tri-Cities. February 9. Subject: Local Sections, Their Aims and Organization, by Secretary Rice.

March 10. Subject: Apprenticeship, Past, Present, and Future, by Wilson P. Hunt, of the Moline Tool Co.

Washington State. February 18. President Carman addressed meeting.

Worcester. February 3. Subject: The Hog Island Ship Yard and Its Construction, by Matthew P. Brush. Motion pictures accompanied address.

February 17. Subject: The Engineer in France by Col. Mason M. Patrick, of the U. S. Engineers Corps.

Providence. March 11. Subject: Symposium on Rhode Island Coals. The speakers were J. D. Guillemette, Professor C. W. Brown, of Brown University, Henry F. Maurel, and Alexander E. Cameron.

Personals

Albert Walton, industrial engineer, has returned to consulting practice, and has opened offices in Philadelphia and Springfield, Mass. under the firm name of Walton & Wright, industrial engineers and manufacturing accountants, who will specialize in work for metal, wood and allied industries, and for textile industries of all kinds.

Chester H. Mannion, formerly in charge of the steam plant of The Nashua Manufacturing Company, Nashua, N. H., has accepted a position as chief engineer of the Petoskey Portland Cement Company, Petoskey, Mich.

George S. Witmer is now associated with the Compania Mexicana de Petroleo El Aguila, Minatitlan, Vera Cruz, Mexico.

Sir Robert Hadfield, Sheffield, England, has been elected vice-president of the Institution of Mechanical Engineers.

J. H. Libbey, formerly electrical engineer for the Eastern Massachusetts Street Railway Company, Boston, Mass., is now with H. M. Haven & Wm. W. Crosby, engineers and architects, Boston.

J. Franklin McNutt has accepted a position with the U. S. Indian Service in connection with gate equipment of the Florence Division Dam. He is at present located in Los Angeles, Cal.

Jacob M. Spitzglass, vice-president and civil engineer of the Republic Flow Meters Company, Chicago, Ill., has been awarded the Edward Longstreth Medal of Merit, by The Franklin Institute, Philadelphia, Pa.

V. V. Carmichael, formerly assistant power superintendent of the Aluminum Ore Company, East St. Louis, Ill., is now in the efficiency department of the Columbia Chemical Division of The Pittsburgh Plate Glass Company, Barberton, Ohio.

John L. Alden is now with the American Insulating Machinery Company, Philadelphia, Pa.

C. B. Cole, formerly manager of the Union Twist Drill Company, Chicago, office, is a member of the newly incorporated Tool Sales & Engineering Co., Chicago, a tool-distributing company.

Cyrus L. Cole, who has been sales manager of the Wisconsin Motor Mfg. Co. since 1918, is now associated with Williams, Cole and Wolff, Inc., Milwaukee, Wis., as vice-president and engineer.

A. V. S. Lindsley has been made sales manager of The Connecticut Light and Power Company, the general office of which is in Waterbury, Conn.

Roger B. Owings has resigned his position with the E. I. du Pont de Nemours & Co. to become connected with the Delaware-Mexican Aztec Oil Company of Tampico, Mexico.

Robert W. Weidenbacker, associated with The Baldwin Locomotive Works, has been transferred from Philadelphia to London, England.

L. M. Gazin, whose position has been that of mechanical engineer of the Federal Light & Traction Co. of New York, has entered the employ of the Beeson Machinery Company, Kansas City, Mo.

L. Ford Merritt, who has been serving as secretary and treasurer of the Wright-Fisher Engineering Company, Detroit, Mich., carrying on this work in his spare time, will now devote his full time to that organization, having resigned his position as consulting engineer of Joseph N. Smith and Company.

E. Field White, formerly with the Hudson Motor Car Company of Detroit, is now with the Drying Systems, Inc., of Chicago, Ill.

Fred A. Scheffler, general manager of the Fuller Engineering Company, New York City, has been elected president of the Edison Pioneers. Mr. Scheffler became associated with Edison in 1881, designing for him the second electric locomotive built for experimental purposes at Menlo Park, N. J.

J. S. Green has severed his connection with the Canadian Ingersoll-Rand Co., of Sherbrooke, Quebec, and is now with the Fuller-Lehigh Company, Fullerton, Pa., as superintendent of shops.

Richard M. Payne is now sales engineer for The Eastern Service Company, Boston. He was formerly with the Bethlehem Steel Corporation, Boston.

George W. Cooke, formerly general superintendent of the Pierce-Arrow Motor Car Company, Buffalo, is now employed in the same capacity by Jas. Cunningham Sons & Co., Rochester, N. Y.

Necrology

Lewis W. Newton, consulting engineer, Enameled Metals Co., Etna, Pa., died on January 12, 1921. Mr. Newton was born in Sterling, Mass., on March 23, 1854. He became a member of the Society in 1903.

Joseph J. Butcher, consulting engineer, Victoria, B. C., Canada, died in 1920. Mr. Butcher was born in Liverpool, England, on August 30, 1849. He became a member of the Society in 1892.

George Parker Symonds, chief of the engineering department, Alberger Condenser Co., New York, N. Y., died on February 2, 1921. Mr. Symonds was born in Ogdensburg, N. Y., on March 26, 1872. He became a member of the Society in 1908.

S. Sakata, professor of mechanical engineering, Tokio Technical College, Tokio, Japan, died on December 1, 1920. Professor Sakata was born in Tokio, Japan, on August 27, 1857. He became a member of the Society in 1891.

[1] For details of the professional careers of deceased members, see necrology section of the forthcoming issue of the Transactions of the Society.

New Members of the Society

In the December 1920 issue of MECHANICAL ENGINEERING there was published a list of those who had qualified for membership in the Society between the dates of August 1 and October 20. The following list includes those attaining membership from October 20 to February 1. The grade is indicated by the symbol after the name; i.e., M-Member; A-Associate; AM-Associate-Member; J-Junior.

ABBOT, Louis A.—M, Washington, D. C.
ABBOTT, Paul W.—AM, Detroit, Mich.
ABERCROMBIE, W. Taylor, Jr.—J, Burlington, N. J.
ABRAHAM, K. J.—AM, Tiruvalla, Travacore, India.
ADAMS, H. A., Jr.—AM, Calcutta, India.
AIZMAN, Francis M.—J, New York, N. Y.
ALLEN, W. R.—M, Cleveland, O.
ANGELOTTI, Germano A.—J, East Pittsburgh, Pa.
ANGEREGG, R. H.—J, LaCrosse, Wis.
ARNOLD, Lyman—M, Lynn, Mass.
ASPROOTH, Axel H.—M, Baltimore, Md.
AUSTIN, Charles G.—J, New York, N. Y.

BALCOME, S. E.—M, Worcester, Mass.
BANKS, John—J, Cleveland, O.
BARKER, Benj. S., Jr.—J, New Orleans, La.
BARKLEY, Matthew B.—M, Charlestown, S. C.
BARNARD, George R.—AM, Birmingham, Ala.
BARNES, Clyde E.—AM, Portland, Oregon
BARNES, L. T.—AM, Long Island City, L. I., N. Y.
BARNES, Robert G.—J, New York, N. Y.
BARTHOLOMEW, B. W.—AM, Palmer, Mass.
BARTON, Chas. P., Jr.—AM, New York, N. Y.
BAYLIS, Roger V.—AM, L. I. City, N. Y.
BEADLE, Robert C.—A, Brooklyn, N. Y.
BEADLE, Walter J.—J, Buffalo, N. Y.
BEAN, Lawrence G.—J, Pittsburgh, Pa.
BEAVEN, Harry E.—J, New York, N. Y.
BEHLER, Edwin J.—J, New Haven, Conn.
BEIDLEMAN, Walter W.—AM, Tracy, Cal.
BELL, H. S.—AM, New York, N. Y.
BENCH, Alfred R.—M, High Bridge, N. J.
BENTLEY, Asa—J, East Pittsburgh, Pa.
BERGMANN, Wm. D.—J, Brooklyn, N. Y.
BJORNSON, Edwin—J, Pittsburgh, Pa.
BLACK, Donald R.—AM, Washington, D. C.
BLAKE, Arthur H.—J, Woolaston, Mass.
BLAKEMAN, Sutherland R.—M, Dyersburg, Tenn.
BLANCHARD, Charles H.—A, Hartford, Conn.
BLEYER, Charles F.—M, Lorain, O.
BLISS, Albert L.—M, Pittsfield, Mass.
BOARDMAN, Clark C.—M, Aurora, Ill.
BOHLIN, John H.—J, Worcester, Mass.
BOHN, Herbert C.—J, Hoboken, N. J.
BOLGER, Robert S.—M, New York, N. Y.
BOND, William H.—M, New Orleans, La.
BONDS, Albert—J, Fairfield, Ala.
BORTON, George W.—M, Philadelphia, Pa.
BOSWORTH, Norman S.—J, Dover, N. H.
BOWLEY, J. W.—J, Philadelphia, Pa.
BOWMAN, J. B.—J, Mechanicsburg, Pa.
BRADLEY, Frank L.—J, Boston, Mass.
BRAND, Mauric B.—J, New York, N. Y.
BRATTIN, Claude L.—AM, East Lansing, Mich.
BREITENFELD, Frederick—J, Hoboken, N. J.
BROIDO, Benj. N.—M, Port Reading, Pa.
BROWN, Albert H.—J, Hamilton, O.
BROWN, C. G.—J, Shanghai, China.
BROWN, Garnet C.—AM, Detroit, Mich.
BROWN, George I.—J, Belfast, Ireland
BULLARD, Herbert A.—M, New York, N. Y.
BULLARD, Stanley H.—M, Bridgeport, Conn.
BURGESS, Robert W.—J, New Brunswick, N. J.
BURKE, Paul—AM, Green Bay, Wis.
BURNETTE, Algernon R.—M, New York, N. Y.
BUTLER, William L.—J, Bridgeport, Conn.
BUZZO, Joseph T.—J, Crockett, Cal.

CALDER, Alexander—J, Youngstown, O.
CALDWELL, James R.—AM, Cincinnati, O.
CALHOUN, Leslie D.—J, St. Louis, Mo.
CAMPBELL, Wm. S.—M, Philadelphia, Pa.
CARLISLE, Fred B.—J, Sound Bend, Ind.
CARLISLE, T. W.—A, Cleveland, O.
CARTER, Donald P.—M, New York, N. Y.
CARTER, Frederic W.—M, West Springfield, Mass.
CARTER, Zenas W.—A, Chicago, Ill.
CATE, Malcolm S.—J, Watertown, Mass.
CAWLEY, G. W.—AM, York, Pa.
CERRETA, Joseph M.—J, Brooklyn, N. Y.
CHILDERS, Foust—J, Anderson, Ind.
CLARKE, Philip L.—M, Jatibonico, Cuba.
CLOUGH, Bert E.—M, Battle Creek, Mich.
COE, Elbert H.—AM, Syracuse, N. Y.
COLEY, Howard B.—J, Waterbury, Conn.
COLOMB, Clifford—J, New Orleans, La.
COLSTON, Robert—J, New York, N. Y.
CONANT, David J.—AM, San Jose, Cal.

CONNORS, WM. B.—M, New York, N. Y.
COOLEY, DWIGHT—AM, Franklin, Philadelphia, Pa.
CORBETT, L. W.—J, Niagara Falls, N. Y.
COUPLAND, R. C.—J, Boston, Mass.
CRAMPTON, D. K.—J, Waterbury, Conn.
CROSBY, C. Whitney—J, St. Paul, Minn.
CROSBY, EDWARD L.—AM, Oakmont, Pa.
CUSTER, GRANVILLE Y.—J, Reading, Pa.

DALE, RICHARD—AM, Amsterdam, N. Y.
DANCY, JASPER J.—J, L. I. City, L. I., N. Y.
DAVIS, A. C.—AM, New York, N. Y.
DEAN, EDWARD—M, St. Louis, Mo.
DECHERD, KIRTLAND W.—J, Meriden, Conn.
DECKER, EDWARD—AM, Newark, N. J.
DEHUFF, HENRY—M, Philadelphia, Pa.
DENNIS, WOLCOTT—J, Cambridge, Mass.
DESMARAIS, GEORGE F.—J, New York, N. Y.
DEVLIEG, R. A.—M, Kalamazoo, Mich.
DEVLIN, E. J.—M, Brooklyn, N. Y.
DIMLER, ERNEST H.—M, So. Bethlehem, Pa.
DINGENS, CARL L.—M, Holyoke, Mass.
DOELL, GEORGE E.—AM, Brooklyn, N. Y.
DOPKE, JOHN C.—J, Milwaukee, Wis.
DORWARD, GEO. D.—M, San Francisco, Cal.
DOUGHERTY, H. M.—M, New York, N. Y.
DOUGHERTY, PATRICK J.—M, Utica, N. Y.
DOUGHERTY, THOMAS—AM, Brooklyn, N. Y.
DOWLING, EUGENE—AM, New York, N. Y.
DOWNEY, FRANK E.—AM, Milwaukee, Wis.
DOWS, HAROLD W.—J, Worcester, Mass.
DRAKE, O. M.—A, St. Louis, Mo.
DRINKWATER, EDGAR L.—M, Chicago, Ill.
DUNLAP, PAUL R.—J, Toledo, O.

EASON, C. M.—M, Newark, N. J.
EATON, BERNARD L.—AM, Philadelphia, Pa.
EDDY, LLOYD C.—AM, Boston, Mass.
EICKHOFF, AXEL—J, New London, Conn.
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CIVIL ENGINEER, MINING, or MECHANICAL ENGINEER. Work consists in writing patent specifications, amending and prosecuting the applications with particular reference to those connected with iron and steel manufacture, including blast and open-hearth furnaces, coke ovens, rolling mills, machine tools and steel-forming tools, and other related items with manufacture of iron and steel. Also to make engineering studies and calculations for problems connected with iron and steel manufacture, calculations relating to properties of steel sections, girders, columns, trusses, foundations and engineering structures. We also prepare technical catalogues and engineers' handbooks. Should have keen and analytical mind and thorough understanding of engineering and technics and should be able to quickly grasp essence of an invention and present it briefly and clearly in the form of patent specifications, and claims. Should be preferably not over 30 years of age and an engineering graduate, preferably with C.E. or M.E. degree. Give full particulars regarding age, education, experience and other technical details which will indicate personality. A recent photograph should be sent. Location Pa. X-211.

TECHNICAL MAN, preferably trained chemist, thoroughly experienced in various aspects of soap making and possessing thorough knowledge of uses of soap and proper soaps for various purposes, and materials employed in manufacturing and qualified, if necessary, to demonstrate products in practical way. Concern manufactures principally textile soaps, but also automobile soaps and other special products. Want, particularly, someone qualified to assist in further developing manufacturing end along scientific lines, and to assist on sales end by showing how to use products and also by helping salesmen through conferences and technical selling information. X-223.

MECHANICAL or CIVIL ENGINEER with sales experience, wanted for executive position with large steel company. Nature of work will be sales promotion and advertising according to ideas of sales manager. To be trained from bottom up. Position offers exceptional future and requires broad-gage man of unusual capacity. Should be as young as is consistent with qualifications required. It is essential that applicant be willing to live in small town, although he will not be permanently located in same. Must be man who places job above all other considerations, and who influences environment more than he is influenced by it. Should be capable not only of producing results from his own work but obtaining them from others. X-224.

SALESMAN for automatic ventilators. Location vicinity New York City. X-229.

EXCEPTIONAL OPPORTUNITY for mechanical engineer having had extensive experience in combustion work. Must be familiar with greater New York City. Would give preference to technical graduate between ages of 30 and 35 years. X-235.

MANUFACTURER of power and heating apparatus requires services of mechanical engineer to act as assistant director of experimental test and development. Ability to lay out and direct work of employees in this department is more important than ability to carry out the processes personally. Exec-

utive ability, clear knowledge of mechanics and usual shop practices, experience in development work along similar lines and persistence for overcoming difficulties, are necessary qualifications for this position. Letter should state age, training, experience, present connection, salary desired and facts concerning personality, mechanical and executive ability. X-244.

EXCELLENT OPPORTUNITY offered in Shanghai, China for thoroughly experienced designing erecting power plant engineer to handle well known equipment for established export organization able to finance any installation. Willing to give responsible capable engineer good salary and opportunity to secure up to twenty thousand dollar interest partnership in firm. Only high grade financially able man considered. Give detailed experience references first letter. All confidential. X-142.

INSTRUCTORS: All engineers willing to consider teaching positions are invited to register with the Employment Service Bureau of the Federated American Engineering Societies. This Service Bureau has been called upon to fill more positions, varying in grade from laboratory assistant to head of department in various engineering and technical schools of this country, than it has been able to take care of from among the men now registered. Blanks for the purpose of registration and information regarding the Bureau may be had by addressing W. V. Brown, Manager, 29 West 39th Street, New York, N. Y.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

COMBUSTION and MECHANICAL ENGINEER, age 27, single, technical graduate. Three years' experience covering combustion problems, operation of steam machinery and boiler tests. Formerly Lieut. in Naval Reserve. Also interested in production or sales work. Seeking broader opportunity. Have ability to render efficient service with end in view of working into executive position. Prefer south, but location immaterial. SM-6086.

GENERAL MANAGER, WORKS MANAGER or SUPERINTENDENT, technically educated mechanical engineer; 15 years' experience manufacturing in many lines of business; familiar with modern scientific methods, including production control, wage payments, cost determination; also with modern manufacturing processes and equipment. Member S.I.E., Assoc.Mem.A.I.E.E. Salary commensurate with responsibilities. Can furnish references. SM-6087.

BUSINESS EXECUTIVE. Sales manager thoroughly familiar with engineering manufacture and distribution of material-handling machinery and power-transmission equipment, particularly in Canadian market. At present employed and would have to give 30 days' notice. Very creditable record in present and previous positions. Prefer salary and bonus on commission arrangement. SM-6088.

MECHANICAL ELECTRICAL ENGINEER desires position on power plant design, testing, construction, or master mechanic, mining and milling operations. Twelve years' experience drafting, design and supervision plant construction. Two years master mechanic large mining company, in charge shops and steam turbine plant. Technical graduate; American; age 28; married. Available at once. References former and present employers. SM-6089.

CONSTRUCTION FOREMAN, age 27, with 12 years' experience sub-station and central station operation, maintenance and construction; some technical training. Now taking I. C. S. course. Desires connection with power company in or near Tampa, Fla. Available immediately. SM-6090.

MECHANICAL ENGINEER technically trained. Broad experience as chief draftsman and designer of steam equipment for stationary, marine and railroad uses, such as safety and relief valves, whistles, pressure and recording gages, etc.; engineer officer in U. S. Navy during war. Employed at present by eastern valve manufacturing company. New York location preferred. SM-6091.

SALES or TECHNICAL position, electrical and mechanical engineer, technical graduate, age 31, single; at present first assistant to consulting engineer; 4 years' manufacturing experience in all departments of plant manufacturing gas engines, steam pumps, and electrical machinery; 3 years' artificial gas, coke oven, and public-utility experience; one year power plant investigations, appraisal and design with consulting engineer. SM-6092.

ENGINEER EXECUTIVE with 10 years' experience in industrial field, on all phases of production, planning and maintenance. Desires position where qualifications of executive ability and engineering training, together with initiative and resourcefulness are demanded. Strong credentials. Location Middle West. Salary $3600. SM-6093.

PLANT and CONSTRUCTION ENGINEER. Age 33; technical graduate with 5 years' electrical construction, including powerhouse, transmission line and substation; 4 years' mechanical and general plant construction; 2 years' steam plant operating and testing. Prefer position as plant engineer, manager or assistant manager. Excellent references. Now employed. Available on reasonable notice. SM-6094.

CRANES, DERRICKS and HOISTING MACHINERY. Chief engineer with old reliable concern employing about 150 men, wants to change position. Age 41; married. Six years in present position, shop and college training. Salary $4000. SM-6095.

MECHANICAL ENGINEER, experienced in tool design and tool room work. Age 33. SM-6096.

EMPLOYMENT SUPERVISOR and experienced interviewer. Age 37. Practical engineering and shop experience. Minimum salary $2400 to start. New England territory; Boston preferred. SM-6097.

SHOP SUPERINTENDENT, general foreman, tool designer. Experienced fire arms, adding machines, auto machinery, metal stamping. SM-6098.

MECHANICAL SUPERINTENDENT with 18 years' practical experience, technical training, machine shop, foundry, locomotives, conveyors, heating and ventilation, *efficiency* work. Specialist in steam power-plant engineering and combustion. Principal experience in connection with railroads, textile mills, and general industrial manufacturing. Capable of directing operations from office as well as in field. Location immaterial. Would consider position in foreign country. Minimum salary $4800. SM-6099.

INDUSTRIAL and PRODUCTION ENGINEER, technical graduate, age 28. Desires connection with consulting industrial engineer or reliable manufacturing concern. Have had broad experience in motion and time-study work, production, standardization, installation of systems, planning and routing, drafting and machine shop. SM-6100.

HIGH GRADE EXECUTIVE, general or factory manager. Age 38. Thoroughly versed in modern methods of manufacturing, production costs, etc. Inventive ability. Practical mechanic with record of successful achievement in high executive positions and handling of help. At present employed. Successful in construction and plant maintenance, designing and building special machinery. Competent to handle large foundry in connection with plant. Salary $8,000 to $10,000. Prefer Chicago, but location immaterial. SM-6101.

WORKS MANAGER or SUPERINTENDENT. American; age 37. Sixteen years' practical manufacturing experience as foreman automatic department, foreman power-press and slitting department, production engineer and factory superintendent. Thoroughly familiar with modern production methods and close observer of costs. Can organize factory for maintaining production under high pressure. At present holding responsible position. Available upon one month's notice. Salary $5000. SM-6102.

PRODUCTION or INDUSTRIAL ENGINEER, graduate, age 26. Experienced on time-study, rate-setting, plant-layout work, production and cost estimating, and production control installation. Desires position as assistant to production or works manager or as junior on staff of industrial engineers. Salary not major consideration. SM-6103.

INDUSTRIAL RELATIONS EXECUTIVE with extensive experience in employment management, educational director (industrial) welfare, safety, trades apprenticeship supervision. Familiar, through actual experience with modern machine-shop practices, steel mills, fire arms, ship yards (steel) electrical manufacturing. Best references available. Technical graduate electrical and mechanical engineering. SM-6104.

HIGH-GRADE EXECUTIVE as superintendent or chief inspector. Thoroughly versed in modern methods of manufacturing, production gaging, costs, etc. Practical mechanic with record of successful achievements in handling help in small or large plant. Age 38. Good technical education. Practical experience received by rising from ranks through merit alone. Open for immediate engagement. SM-6105.

SALES EXECUTIVE, familiar with machine-shop equipment and production (now employed) seeks to better position; 20 years' machine tool experience as salesman, sales manager and general manager of works employing 1000 men. Large acquaintance and excellent reputation in New York City and eastern states. Graduate of Massachusetts Institute of Technology. Age 44; married. Salary commission basis preferred. SM-6106.

ENGINEERING EXECUTIVE, graduate mechanical engineer desires position of responsibility with American firm in Eastern Canada. Experience: machinist, draftsman, designer, assistant superintendent Massachusetts firms 12 years. Executive and consulting industrial engineer U. S. and Canada eight years. Desires position justifying giving up income $7500. Wide acquaintance, highest references character and ability. Age 40. Available May 1, 1921. SM-6107.

EXECUTIVE ENGINEER, 24 years' experience with thorough technical and practical training, covering various stages from machinist to supervising mechanical engineer. Work comprised direction of design, supervision of production tests, completion of data, to insure intelligent execution of work and to secure proper coordination in production and thoroughness of execution in organization. SM-6108.

MECHANICAL ENGINEER, technical graduate. Five years' shop and design experience on oil engines, for two years assistant to chief engineer, and in charge of drafting on Diesel engine development, now in abeyance because of industrial conditions. Business and executive ability. Best references. SM-6109.

MECHANICAL ENGINEER or EXECUTIVE, age 40, American, 20 years' experience on high-grade mechanical engineering work to that type of executive having had charge of complete mechanical equipment for large corporation covering entire U. S. Wishes to exchange references with substantial concern only wherein ability based on actual experience counts. Present salary $5200. Would like position of responsibility and chance to use acknowledged inventive ability along manufacturing development and process lines. Will consider Chicago or any section west of same. SM-6110.

MECHANICAL ELECTRICAL ENGINEER, technical graduate with 13 years' experience in maintenance, construction and design of power plants, steam turbines, industrial plants, steam, electrical and water distribution systems. Will consider any reliable proposition in South American, West Indies, Pacific Islands or domestic. Working knowledge of Spanish. At present employed. SM-6111.

MECHANICAL ENGINEER, age 30, desires executive position with reliable concern. Experience covers design and development of tools for quantity production, special and automatic machinery, specializing on gumming, labeling and paper-handling machinery. New York City or vicinity preferred. SM-6112.

ASSISTANT to SUPERINTENDENT, production manager, or industrial engineer. Graduate of technical school of highest standing. Has had training and experience in solving problems of manufacturing and its administration. Desires permanent connection with progressive concern in Massachusetts, preferably near Boston. SM-6113.

MECHANICAL ENGINEER, age 29, married; 7 years' experience in mechanical and electrical design, plant construction and maintenance, and organization work; desires position with opportunity for advancement. Employed at present. SM-6114.

MECHANICAL ENGINEER; M.E. Cornell, age 28. Experience; combustion and power engineer in oil and coal-fired plants. Smith gas producers, assistant works engineer in plant employing 2000 men; traveling power engineer for corporation having 5 plants in Middle West. Employed. Salary $3600. Best references. SM-6115.

MECHANICAL ENGINEER, highly capable inventor of exceptional creative ability, ingenuity and skill. Technical graduate and thoroughly practical mechanic; 26 years developing inventions into manufacturing and commercial possibilities, designing and building special automatic machinery, directing manufacturing and engineering works. Specialist and recognized expert in this branch of engineering. Last salary $7800. SM-6116.

GRADUATE MECHANICAL ENGINEER, age 30. Experienced in economics, design and field inspection of power and industrial plants and all forms of mechanical equipment, seeks permanent connection with up-to-date firm demanding thorough mechanical training, broad general education, responsibility, initiative, and resourcefulness. Training includes practical acquaintance with tools and mechanical processes. High-class references and chart giving details of experience on request. Must have New York City or environs as base, but will travel anywhere for field work. $3000 to start. SM-6117.

MECHANICAL ENGINEER, M. I. T. graduate; age 28. Six years' experience in general plant engineering, maintenance and construction, machine design, experimental and development testing of electrical apparatus. Desires to get into production and management work, or into position along executive lines with industrial concern. SM-6118.

MECHANICAL ENGINEER, technical graduate; age 26; married. Desires to locate with progressive company as assistant engineer; 5 years' experience in design of plant installation, construction, estimating and maintenance. Location New York or vincinity. SM-6119.

ENGINEERING EXECUTIVE, age 36. Fifteen years' broad experience in economics and scientific manufacture of small parts for mechanical and electrical devices, covering costs, production methods, research work, tools, machinery, automatic devices and assembling methods. Capable of solving present difficulties, raising products to required standards and equipping for manufacture of new articles. Desire executive, research or engineering position. Location immaterial. Salary about $5000 SM-6120.

ELECTRICAL ENGINEER, member A.I.E.E. Age 41. Fifteen years' experience in general industrial and power-plant engineering. Position preferred in Boston or New York City. Available in 30 days. SM-6121.

MECHANICAL ENGINEER, age 38; married; graduate; at present engaged; 18 years' experience in steam engineering, reciprocating machinery and unaflow engines, as draftsman, designer, consulting engineering, inventor; desires suitable permanent position; preferably steam engineering, research or experimental. Excellent record and references. Resourceful. Capable taking charge. East preferred. SM-6122.

MECHANICAL ENGINEER, graduate; age 27. Six years' experience including shop management, physical testing, heat treatment, pyrometry, experimental work, etc. Familiar with pressed steel, and hot drawn-steel practice. Unusual inventive ability. East preferred. Excellent references. SM-6123.

PRODUCTION ENGINEER, or manager; technical education; 5 years' practical experience in shops and executive positions. Thoroughly familiar with planning and scheduling works of large factory. Can also install modern methods of production control. Age 30. Have successful record and can give excellent references. SM-6124.

MECHANICAL SUPERINTENDENT, age 40; married; technical graduate. Broad experience as designing engineer and 12 years' practical experience as plant engineer; expert on production of power construction and plant maintenance. Experience covers machine shop, textile, foundry and woodworking equipment. Salary desired $5000. SM-6125.

WORKS MANAGER or SUPERINTENDENT, mechanical engineer, age 33, thoroughly familiar in all branches of crude-rubber industry; experience in construction and installing of rubber and sugar machinery; acquainted with Africa and South America; location immaterial. SM-6126.

MECHANICAL ENGINEER, technical graduate; 16 years' experience in design of machinery, special apparatus, factory and plant buildings and plant maintenance. Experience in water gas, soap manufacture, chemicals, and colliery maintenance work. Salary $3000. SM-6127.

PLANT ENGINEER, age 31; married; 11 years' experience. Have had full charge of planning and erecting new buildings and planning and installing machinery and equipment; also maintenance of buildings, machinery, and power plants. Aggressive, resourceful, tactful executive and organizer; capable of handling big job. SM-6128.

GRADUATE MECHANICAL ENGINEER, M. I. T. and Harvard 1918. Desires connection as junior executive with organization where training and knowledge of engineering would be exercised. Experienced as executive in sales, production, and appraisal of buildings and manufacturing equipment. Prefer location of New York or New England, but willing to travel. SM-6129.

MECHANICAL ENGINEER, conscientious, capable, age 31; married. Nine years' varied engineering experience. At present in executive capacity. Desires work which will be of broadening character. SM-6130.

WORKS MANAGER. Competent executive; for past eleven years have had responsible charge of production in works employing from 500 to 3000 hands; both in machine-tool building and small interchangeable parts as ball bearings and phonographs. Educated at Massachusetts Institute of Technology; married; age 35. SM-6131.

MANAGER, graduate engineer, shop trained; age 36. Has installed cost and production systems, managed small factory, and is now executive with large company. Would like to connect with small concern manufacturing real product, at modest salary with chance to share in increasing profits. SM-6132.

MECHANICAL or MAINTENANCE ENGINEER. Technical graduate, age 31; single; 9 years as master mechanic, maintenance engineer, and mechanical superintendent in industrial plants. Desires connection with industrial concern in any of above or similar capacity where past experience will be of advantage. SM-6133.

MECHANICAL SUPERINTENDENT, age 32. Thoroughly experienced in design and construction of tools and special machinery for interchangeable manufacture. Six years' shop experience, 9 years' as designer, chief draftsman and superintendent; 7 years' in automobile industry. Not technical graduate; have worked up from bottom. At present employed. Location immaterial. Salary $3600. SM-6134.

DRAFTSMAN familiar with design and construction of brass, iron and steel valves for steam and water. Location East. SM-6135.

MECHANICAL ENGINEER, technical graduate; 14 years' experience in steel plant, machine shop and industrial engineering. At present engaged in industrial-plant layout and production work. Desires position with industrial engineering company or industrial plant. Location Philadelphia or vicinity. SM-6136.

ASSISTANT SUPERINTENDENT to take complete charge of machine and power installation, upkeep, new and reconstruction building work, fuel saving. Knows modern production methods. References present or any past employers. SM-6137.

MECHANICAL SUPERINTENDENT, American, age 40; married. Machinist, toolmaker, foreman, superintendent, manager. Has ingenious methods, especially familiar with small and large press stampings. Desires interest in business as well as executive position. SM-6138.

MECHANICAL ENGINEER, age 34; technical graduate, with varied experience along structural and mechanical lines, especially as designer of industrial furnaces and burners; desires responsible position with growing concern. Available at short notice. Best references. Location immaterial. SM-6139.

GENERAL SUPERINTENDENT or assistant, technically trained, B.S. and M.E. degrees, age 30, married; 7 years' production experience as executive of machinery manufacture. Conversant with Gantt and Emerson systems of control, accounting, and incentives. Good references; thoroughly modern and efficient; now employed; salary $4000. SM-6140.

GENERAL MANAGER, who has successfully developed specialized machinery-manufacturing business, engaged both in domestic and export trade, now available. Thoroughly competent engineer; also attorney. Equally capable in organizing, selling or developing product. Prefer connection with moderate-sized company which is capable of large expansion and which offers future worth giving up $10,000 year position. SM-6141.

MECHANICAL ENGINEER, experienced in design, construction and maintenance of power plants, mills and factories, desires connection in executive capacity with established concern or as organizer in new enterprise of reliable financial backing. Would act as valuation investigator for financial institution; 20 years' experience. Age 46. References furnished. New York and New Jersey metropolitan district location preferred. SM-6142.

ASSISTANT PRODUCTION ENGINEER or shop superintendent, age 32; married. Exceptional shop, technical and educational experience on large and small work. SM-6143.

TECHNICAL GRADUATE MECHANICAL ENGINEER desires opportunity to locate with concern who wants young engineers to train for executive positions. Will start at beginning with idea of promotion. Steady, ambitious and reliable. Desires experience and chance to progress. SM-6144.

SUPERINTENDENT, age 35; experienced in sheet and metal manufacturing such as building material, metal windows, heating and ventilating, flume, culverts, tanks, etc. Experience in cost systems, installation of equipment, arrangement of plant and handling of material, also in field on metal fumes and irrigation projects. Pacific Coast preferred. SM-6145.

MASTER MECHANIC or PLANT ENGINEER, age 30. Ten years' experience in design, installation and maintenance of brass mill machinery, also foundry and machine-shop equipment. At present employed. Location New England preferred. SM-6146.

MECHANICAL ENGINEER, age 45, technical graduate; 20 years' experience in steam engineering, mainly on design of steam engines and turbines. Broad theoretical knowledge of power plant engineering (steam, gas and electric); desires position with manufacturing or engineering concern. SM-6147.

MEMBER of mature age, with exceptionally broad education and experience would like position where executive and sales experience can be capitalized to fullest extent. At present employed and would not make change except for very generous prospects based upon results. Qualified to hold position as manager, sales manager or district manager. SM-6148.

MECHANICAL ENGINEER, age 32, practical experience covering 12 years on design and manufacture of special and automatic machinery, machine tools, jigs and fixtures and dies, plant engineering, foundry practice and production methods, desires responsible position as engineer or asistant executive. SM-6149.

GENERAL SUPERINTENDENT or supervising engineer, technically trained engineer in addition to being practical mechanic, with 20 years' varied experience; exceptional ability for getting best results from men, materials and equipment, for developing progressive methods and labor-saving devices for quality, quantity and low cost in growing concern or for working out new enterprises. SM-6150.

MECHANICAL ENGINEER, technical graduate, M.E. degree. Experience, 2 years' railroad mechanical equipment tests; 2 years' mill-building design and construction; 4 years' assistant mechanical engineer in steel mill. Latter has covered industrial power-plant design and constructon, and economy of mechanical-equipment layout operation and maintenance. Desires position as engineering or industrial executive. Employed at present. SM-6151.

SALES ENGINEER or REPRESENTATIVE, age 38; married; technical graduate; membership also in related societies. Seventeen years broad experience, apprentice up; especially familiar with marine and power-plant engineering; qualified marine engineer; integrity, personality, useful business acquaintances. Present holding responsible government position, but desires connection offering larger opportunities. Further particulars with references. Prefer development Canadian territory. SM-6152.

MECHANICAL ENGINEER, age 35. Fourteen years' experience in design, construction, manufacturing and operation, plant layout, maintenance, etc.; desires connection with medium-sized growing concern where future is promising. Can handle men. Location in East preferred. Small town location no objection. At present employed. SM-6153.

MECHANICAL ENGINEER, age 41; married. Twelve years' experience with large Portland cement concern, designing and operating, wishes position as superintendent, mill or quarry. A-1 references. SM-6154.

MECHANICAL ENGINEER, technical graduate, has served as machinist, maintenance foreman, draftsman, designer and experimental engineer, principally on marine, steam and heavy-oil engines, and air compressors. At present employed, but wishes larger opportunity. SM-6155.

WORKS or GENERAL MANAGER. Have had varied experience in tool and machine manufacture and machine-shop practice in general; number of years' experience with celluloid machinery especially from manufacturing end. Metropolitan district location preferred. Age 39; single. M.E. Stevens, class '04. SM-6156.

MECHANICAL ENGINEER, age 27. Five years' experience as draftsman, designer, experimental engineer and executive's assistant on light and medium weight products suitable for interchangeable manufacture. At present employed in large

organization. Desires engineering position with medium-sized concern where there will be ample opportunity for advancement. SM-6157.

CONTRACTING ENGINEER. New York representative of large manufacturer handling domestic and foreign sales of mechanical and structural lines is open for negotiations with a well-established firm requiring similar service. Good executive. Fifteen years' experience in design and sales. Salary $7500. SM-6158.

MECHANICAL or INDUSTRIAL ENGINEER, age 34; married; technical graduate. Six years' railroad experience, design and construction substations, shops, car barns and subway construction, 8 years' design and construction complete industrial plants, power plants, etc., including buildings and equipment; investigations, reports, and appraisals. At present employed as works engineer of cordage plant. Desires connection with engineers or progressive industry. Location in or near New York City. SM-6159.

SALES ENGINEER, graduate M.E., 5 years' cooperative course at University of Cincinnati. Experience covers subordinate and executive positions in iron foundry, machine-shop, production and efficiency engineering, tool-design and plant layout, inspection, correspondent, and two years of sales engineering. Age 27. SM-6160.

MECHANICAL ENGINEER specializing in industrial plant design and maintenance work. SM-6161.

ENGINEER and export salesman, age 33; married. With engineering and export house, New York. Six years' experience, construction and design hydro-electric and steam-power plants; two years as salesman for machinery and steel products for Far East. Desires connection as export sales manager. SM-6162.

MECHANICAL ENGINEER, technical graduate; 11 years' experience. Has successfully served as teacher of mechanical and experimental engineering, designer, chief draftsman and assistant engineer on such work as gas engines, oil-mill machinery and tractors. Desires permanent position as chief draftsman, assistant engineer or similar position. SM-6164.

MECHANICAL ENGINEER, single; age 33; 14 years' experience in design, construction in power-plants, heating, ventilation, industrial plants-maintenance work. Reports, correspondence and inspection of branch plants in U. S. Was engineer in Navy. Working knowledge of German. Desires change with future. Location immaterial. Salary $4000. SM-6165.

MILL ENGINEER, technical graduate, age 32, experienced in designing, estimating and inspecting building construction and equipment installation for power plants, chemical works, and smelters. Best of references as to ability, character and personality. Available immediately. SM-6166.

WORKS or GENERAL MANAGER. High-grade executive; 27 years' practical experience on buttons, brass goods and novelties of all descriptions—phonographs, watches, clocks and composition goods. Largest number of people handled 6000. Wishes to connect with concern employing from two to five thousand. Would leave matter of salary to employer. First-class references. SM-6167.

MECHANICAL ENGINEER, age 38, in charge of maintenance, construction, and fire protection in rubber mill. Formerly assistant professor with 9 years in engineering teaching. Later production engineer on small arms. Seeks location in or near Connecticut as works engineer or manager in any line. Minimum salary, $4600. SM-6168.

WORKS MANAGER or general superintendent; 25 years' experience manufacturing high-grade machinery, automobiles, and products requiring interchangeable parts. SM-6169.

WORKS ENGINEER or WORKS MANAGER. Broad industrial experience through consultant work. Power plants, process work and development; handling materials in bulk as liquids and gases; plant supervision and management. Desires permanent position paying not less than $5000. Technical education; age 31. Employed at present as works engineer. SM-6170.

MECHANICAL ENGINEER, technical graduate; age 28. One year as draftsman; one year foreman on pipe work; 2 years' with consulting engineer; 2 years' planning of mechanical construction. Four of above 6 years' experience spent in direction of responsible work. Salary $3600. Philadelphia location preferred. SM-6171.

MECHANICAL ENGINEER, 25 years' experience managerial and selling capacities here and abroad, is open for engagement. Possesses initiative, resourcefulness and tact. Has been particularly successful in introduction of new products. Experienced writer on technical subjects for leading trade journals. New York location preferred. SM-6172.

WORKS MANAGER or SUPERINTENDENT, technical education, backed by 23 years' successful executive experience. Thorough technical and practical knowledge of up-to-date organization. American, age 48; practical mechanic and mechanical engineer. Especially well trained in manufacture of high-precision quantity production. Served 18 months in Ordnance Dept. with rank of Major. Good clean record. Desires to locate with progressive business, where proven ability will be recognized. SM-6173.

WORKS ENGINEER, age 27, technical graduate; 3 years' experience on design, installation and maintenance; 1 year's experience operating engineer, turbines and engines. Location immaterial. SM-6174.

ASSISTANT MECHANICAL ENGINEER or designer; 5 years' experience as assistant mechanical engineer and designer investigating manufacturing problems and designing tools, jigs, fixtures and special machines for the manufacture of sewing machines and automobile parts. Fast board man. Technical school training. Good references. Location preferred, New York or New Jersey. SM-6175.

MASTER MECHANIC, graduate mechanical engineer, age 41; structural engineer's license. Qualified to take charge of design and construction of new factory buildings, supervision maintenance of buildings, installation and repair of machinery, operation of power plants, heating and lighting system; 18 years' experience along this line. Now available. SM-6176.

SALES ENGINEER with over 20 years' experience in general mechanical lines, including refractory materials. Location Illinois. SM-6177.

PROFESSOR mechanical engineering now connected with large university wishes change. Can cover any work in department of mechanical engineering. Has had extended experience in design, manufacture, erection, test, operation and appraisal of power plants and power plant machinery. Has had experience in consulting field. Would accept position with progressive university, consulting firm, or large corporation as consulting engineer. SM-6178.

ACETYLENE ENGINEER desires connection with reliable concern; technical education; 3 years' experience in mechanical engineering, 4 years' experience in designing, operating and installing large oxyacetylene plants. Practical experience in welding and cutting of all metals. Considerable executive experience. SM-6179.

MECHANICAL and POWER ENGINEER, age 28; single; technical graduate, B.S. and M.E.; 6 years' experience along broad lines—chemical manufacturing; machine-shop; metallurgy; sugar engineering; industrial and power plant practice, operation, layout, design, calculations, steam heating, research, etc. Has business and executive ability and can handle men; desires connection as mechanical engineer, works engineer or similar responsible position. SM-6180.

PRODUCTION ENGINEER. Mechanical engineer 1918 Stevens Institute of Technology. Has had both basic machine-shop and plant experience. SM-6181.

MECHANICAL ENGINEER, CHIEF ENGINEER, MASTER MECHANIC. Technical graduate with 12 years' experience. Capable of taking complete charge of engineering and construction. Specialist on combustion, power-plant development, furnace design and low temperature carbonization processes. Would be excellent man for consulting engineer. Location preferred, New York City. SM-6182.

WORKS MANAGER or SUPERINTENDENT with 18 years' practical manufacturing experience; 3 years' industrial engineering, installing cost, production and office methods; 4 years' works manager; 6 years' foreman and superintendent. Have organized and built up two industries from beginning. Thoroughly familiar with principles of modern manufacturing methods. Experienced cost accountant and certified traffic manager. Now employed as industrial engineer, but desire permanent connection with growing, progressive concern. American, 40, perfect health. Available May 1. SM-6183.

PRODUCTION MANAGER, superintendent, works manager or assistant mechanical engineer; Stevens; age 34. Six years' experience time study, planning, scheduling, stores, inspection, shop organization, central and departmental production-control employment, safety and welfare. Large or small precision interchangeable parts. Newark or metropolitan district location. SM-6184.

ELECTRICAL ENGINEER, thorough experienced in high and low tension generation, transmission, and distribution engineering. Also experienced in steam power-plant design and construction throughout. Desires active and responsible position. Present employed. Technical graduate 1914. Health excellent. Salary desired $3600. SM-6185.

SALES EXECUTIVE age 35; married; technical education. Drawing room, shop, construction and sales experience. Accustomed to closing large contracts, dealing generally with heads of departments where work is planned and placed. Experience mostly foundry, machine, boiler, tank and forge work. Large clientele. At present employed as officer of New York engineering company. SM-6186.

POWER ENGINEER. Can cut power costs. Thoroughly familiar with combustion, power, generating equipment, distribution of steam and electricity. Experienced in design, construction and operation of manufacturing and power plants. Open for position of works engineer, mechanical superintendent, assistant chief engineer or chief engineer. Cornell graduate; age 34. Location preferred New York, New England or eastern Pennsylvania. SM-6187.

EXECUTIVE ENGINEER or PROFESSOR, M.E. graduate of University. Experienced in executive engineering, designing, research, plant engineering and teaching of mechanical-engineering subjects. At present unemployed; wishes to become associated with manufacturer or university along above lines. Salary not main object. Location preferred Eastern U. S. or Europe. SM-6188.

MECHANICAL ENGINEER; age 36; sixteen years varied experience in mechanical engineering, desires to enter sales field with firm handling mechanical apparatus. Willing to make sacrifice for opportunity where conscientious effort will be appreciated. SM-6189.

INSPECTOR SUPERINTENDENT or executive. 10 years' automotive and five years' gunshop and ordnance inspection experience. Familiar with organization and systematizing inspection forces. Ex-1st. Lieut. References furnished. Age 40, married. Location no object. Minimum salary to start $3000. Available at once. SM-6190.

TECHNICAL ASSISTANT to executive. Age 31, married; six years' experience in factory administration, chiefly; time study, wage systems, improvement of methods and special processes, routing, equipment, layout analysis of factory conditions and expenses. Desires change due to unsettled business conditions. SM-6191.

RESEARCH ENGINEER, chemical or oil industry, technical graduate. Position desired with corporation or industrial engineer where present plant equipment is under investigation for economic results or plant development is required on the application of patented processes. Salary $3600. SM-6192.

MANAGER, general superintendent or superintendent Industrial engineer, member, American, M. E., age 43. Twenty-three years' broad experience in design, manufacture, construction and operation, investigation and appraisal, cost analysis, purchasing and management of industrial manufacturing plants in several fields. Machinery, steam specialties chemicals, power and hydraulic plants. Open for responsible position. Location immaterial. SM-6193.

MECHANICAL ENGINEER, desires position with manufacturing firm, preferably in Canada. Besides degree, holds stationary and marine engineering certificates having been second engineer officer in ships up to 20,000 hp. Has completed special course in industrial engineering (time-study and organization) in which work now employed. Member Engineering Institute of Canada, and graduate of the Institution of Mechanical Engineering. SM-6194.

GRADUATE MECHANICAL ENGINEER, age 28; single; three years' machine designing and two years' machine shop experience. At present assistant to works engineer and superintendent of construction work in industrial buildings, estimating; heating and ventilating; machine-shop layouts and plant equipment. Wishes position of responsibility. SM-6195.

MECHANICAL ENGINEER, specializing in invention, research and machine design. Can work out machines from the fundamental ideas to the finished details. SM-6196.

MECHANICAL ENGINEER, technical graduate has served as machinist, maintenance foreman, draftsman, designer and experimental engineer, principally on marine steam and heavy-oil engines, and air compressors. At present employed but wishes larger opportunity. SM-6197.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER APRIL 12, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 257.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by April 21, 1921, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

ALTHOUSE, WILLIAM S., Construction Engineer, General Petroleum Corpn., Los Angeles
BLABON, ORIN F. Chief Mechanical Draftsman, Layne & Bowler Corpn., Los Angeles
ELWELL, LLOYD E., Designer, Western Machinery Co., Los Angeles
JOHNSON, CLARK C., Assistant Engineer, General Petroleum Corpn. Vernon
RAWSON, LESLIE A., Draftsman, Standard Oil Co., El Segundo

Connecticut

CLARK, JOHN W., Sales Manager, The Connecticut Electric Steel Co., Inc., Hartford (Re-election)
McCROSKY, DONALD W., Assistant Engineer, General Electric Co., Bridgeport
MOODIE, WILLIAM C., Mechanical Engineer, Waterbury Farrel Foundry and Machine Co. Waterbury
SMITH, SETH G., Assistant Metallurgist, Billings & Spencer Co., Hartford
SPAUNBURG, HARVEY L., Engineer, Counter Department, C. J. Root Co. Bristol

District of Columbia

HECKER, ARTHUR E., Nitrate Division, Ordnance Department, Washington
MacCORMACK, JOHN G., Assistant to Officer in charge of Motor Transport Training Schools, United States Army, Washington
OWEN, WILLIAM O., Professor of Anatomy, Georgetown University, Washington

Georgia

WEBBER, EATON, Assistant Professor, Georgia School of Technology, Atlanta

Illinois

BACON, LEWIS, Chief Engineer, Monsanto Chemical Works, East St. Louis
BORGSTROM, CHESTER, Draftsman, W. A. Jones Foundry and Machine Co., Chicago
CROSS, ROBERT A., Production Engineer, Rock Island Arsenal, Rock Island
EARLE, NORMAN P., Executive, Benjamin Electric Manufacturing Co., Chicago
MARCILLE, GILBERT G., Engineer, American Coke & Chemical Co., Chicago
POOLE, ARTHUR F., Vice-President and General Manager, Remington Accounting Machine Corpn., Chicago
ROSECRANS, CRANDALL Z., Research Graduate Assistant, Mechanical Engineer, University of Illinois, Urbana
STANDISH, EDWARD K., Mechanical Engineer, Rock Island Arsenal, Rock Island
WRIGHT, CECIL K., Designer, International Harvester Co., Chicago

Indiana

ADMIRE, AMZI O., Electrician and Mechanic, Merchants Heat & Light Co., Indianapolis
HETHERINGTON, CARL F., Mechanical Engineer and Treasurer, Hetherington & Berner, Indianapolis
HOUSE, LEONARD A., Branch Manager, Fort Wayne Engineering & Manufacturing Co., Fort Wayne
JANSO, ERNEST J., Chief Draftsman, Oliver Chilled Plow Works, South Bend
TOY, HENRY K. J., Student, Purdue University, LaFayette

Kansas

THORPE, CLAUDE, Superintendent, Best Bros. Keene's Cement Co., Medicine Lodge

Maryland

ESTERSON, MILTON M., Baltimore
REITZ, ROBERT A., Instructor, Baltimore Polytechnic Institute, Baltimore

Massachusetts

APPLETON, HARRY W., Chief Steam Engineer, Gilbert & Barker Manufacturing Co., West Springfield
ASHLEY, ROBERT L., Engineering Department, Millers Falls Tool Co., Millers Falls
COTTON, EDWIN R., Turbine Calculator, General Electric Co., Lynn
FUJIMURA, SENICHI, Assistant Mechanical Engineer, North Packing & Provision Co., Somerville
FREETHY, GEORGE E., Sales Engineer, Worthington Pump & Machinery Corpn., Boston
GRAVES, JOHN L., Selling Agent, Saco-Lowell Shops, Boston
GRIMSHAW, FRED H., Mechanical Engineer, The Heald Machine Co., Worcester
HOPKINS, EDWARD W., Gage Engineer, Springfield Armory, Springfield
LIFNER, ERIC J., Estimating Department Engineer, Worthington Pump & Machinery Corpn., East Cambridge
MAGLATHLIN, SYDNEY A., Supervising Safety Engineer, Boston Engineering Department, Ocean Accident & Guarantee Corpn., Boston
PECK, LOUIS E., Broach Engineer, Velco Manufacturing Co., Inc., Greenfield
RICKERT, LOUIS L., Sales Engineer, Nightingale & Childs Co., Boston
ROBINSON, WARREN A., Draftsman, Worthington Pump & Machinery Corpn., Cambridge
SKILLIN, CLIFFORD A., Assistant to Consulting Engineer, United States Smelting, Refining & Mining Co., Boston
STRATTON, EARLE R., Scovell Wellington & Co. Boston
SULLIVAN, CARL E., Sales Manager, The Foxboro Co., Inc., Foxboro
WIDGER, THURLOW S., Treasurer and Sales Engineer, Widger & Miller Co., Boston
WILKINS, ALBERT F., Estimator, Walworth Manufacturing Co., S. Boston
WILSON, CHARLES G., District Sales Manager, Elliott Co., Boston

Michigan

BANGHART, LEE E., Mechanical Draftsman, Union Steam Pump Co., Battle Creek
CRAIG, OLLISON, Engineer in charge of Testing and Research Department, Underfeed Stoker Co., Detroit
McELROY, PETER S., Salesman, Peninsular Machinery Co., Detroit

Minnesota

ROCKART, EDWARD R., Consulting Engineer, Bureau of Public Buildings, St. Paul

Missouri

BEEBE, HAROLD N., Layout Draftsman, Busch Sulzer Bros. Diesel Engine Co., St. Louis
RINZEGGER, VICTOR, Designer, Busch Sulzer Bros., St. Louis
BRUSH, PETER F., Chief Engineer, Hotel Statler, St. Louis
JEUDE, ADOLPH J., Draftsman, Busch Sulzer Bros. Diesel Engine Co., St. Louis
PIOTRASCHKE, FRED, Draftsman, Monsanto Chemical Works, St. Louis
REIFEISS, EMIL F., Layout Draftsman, Busch Sulzer Bros. Diesel Engine Co., St. Louis
WALL, ALBERT G., JR., American Brake Co., St. Louis

New Hampshire

KIMBLE, EARL C., Mechanical Draftsman, United States Navy Department, Portsmouth
PROCTER, HOWARD E., Ship Draftsman, Portsmouth Navy Yard, Portsmouth

New Jersey

BROWN, LEE R., Experimental Design, Monroe Calculating Machine Co., W. Orange
CROWLEY, GUY F., Draftsman, New York Shipbuilding Corpn., Camden
EDWARDS, JOSEPH R., General Superintendent, Tide Water Oil Co., Bayonne
GORDON, ALLAN W., Salesman, Elevator Supplies Co., Hoboken
HANCE, JAMES, Chief Engineer, Celluloid Co., Newark
HAYDOCK, JOHN, JR., Production Manager, Niles-Bement-Pond Co., Plainfield
HEIL, WILLIAM, Superintendent of Tools, Edison Phonograph Works, Orange
KOHL, FRANK E., JR., Works Engineer, Cott a Iap Co., Somerville
MacLEAN, J. ALDEN, Ingersoll-Rand Co., Phillipsburg
PETERS, FRED C., Superintendent, New Era Manufacturing Co., Paterson
RIKER, MALCOLM D., Vice President, McKiernan Terry Drill Co., Dover
SCHWEITZER, CHARLES F., Chief Draftsman, Klaxon Co., Newark
VAN DYKE, HERBERT H., Newark
WHITE, DEGRAY, Foundry Superintendent, Niles-Bement-Pond Co., Plainfield
WILSON, GEORGE S., Chief Engineer, Tuscarora Oil Co., Ltd., Elizabeth
ZABRISKIE, CLAUDE I., Chief Engineer, The Sipp Machine Co., Paterson

New York

ABELL, ROSS A., Max Ams Machine Co. New York
AITKIN, SAMUEL, Superintendent Engineer, Moore & McCormack Co., New York
ALLEN, THOMAS M., Mechanical Engineer, R. Ingersoll & Brother, New York
AULT, E. STANLEY, Instructor in Machine Design, Cornell University, Ithaca
BAKER, JOHN N. A., Assistant to Secretary and Treasurer, National Conduit and Cable Co., Hastings-on-Hudson
BATEMAN, GEORGE F., Assistant Professor of Mechanical Engineering, Cooper Union, New York
BEARCE, GEORGE D., Engineer, News Print Service Bureau, New York
BRANDT, ERNST H., JR., Sales Engineer, Wm. P. Heineken, New York
BRINLEY, CLARENCE C., Manager, Trolley Carrier Department, Conveyors Corpn. of America, New York
BRISTOL, BERNARD R., Engineer in Charge of Stationary Superheater Design, Locomotive Superheater Co., New York
BURCHELL, EDWARD H., Designer, Dover Boiler Works, New York
CLARKE, BERTRAND R., Engineering Finance, New York
COHEN, EMANUEL M., Draftsman, Francisco & Jacobus, New York
CROWLEY, ROBERT, Sales Engineer, Joseph T. Ryerson & Sons, New York
DURBECK, ALBERT C., Foreman, Cohoes Iron Foundry & Machine Co., Cohoes
EATON, LEWIS H., Engineer, Richard L. Wood & Co., Buffalo
ELLISON, STANLEY H., Assistant Building Engineer, Western Electric Co., New York
FOWLER, OTIS L., Assistant Construction Engineer, American Sugar Refining Co., Brooklyn
GILLESPIE, JOHN V., Superintendent Engineer, Sigsbee, Humphrey & Co., New York
GOLDREYER, JOHN, Mechanical Draftsman, Board of Education, New York
GOULDEN, JOSEPH M., Sales Manager, Penn Mutual Life Insurance Co., New York
GRIMMER, AUSTIN S., Chief Draughtsman, Mergenthaler Linotype Co., Brooklyn
GUIGOU, MARC A. P., Assistant to Mechanical Engineer, The New York Edison Co., New York
HARDING, PERCIVAL N., Inspector of Repairs, United American Lines, New York
HARLOW, RAY L., Pratt Institute, Brooklyn
ISAKSEN, ROBERT C., Brooklyn
JACKSON, ALBERT A., Erecting Engineer, Chicago Pneumatic Tool Co., New York

JACKSON, MILLARD I., Sales Engineer, Griscom-Russell Co., New York
JACOB, LOUIS C., Purchasing Department, Walter Kidde & Co., Inc., New York
JORGENSEN, HANS F., Master Machinist, United States Navy Yard, Brooklyn
LANDELL, JOHN A. B., Chief Engineer, Gasoline Recovery Corpn., New York
LANGE, RICHARD, Manager, Peerless Roll Leaf Co., Inc., New York
LIMONT, ALEXANDER W., Works Manager, National Conduit & Cable Co., Inc., Hastings-on-Hudson
McMAHON, JOHN F., Engineer, Johns-Manville, Inc., New York
OATES, FRANK R., In charge Engineering Department, Robertson-Cole Co., New York
PARLETT, RAYMOND C., Engineer, Johns-Manville, Inc., New York
PIETSCH, WINFRED V., Sales Engineer, Conveyors Corporation of America, New York
PODOLOFF, NATHAN, Assistant to Chief Engineer, The Barrett Co., New York
RICHTER, LYZON W., American Ever Ready Works of National Carbon Co., Inc., Long Island City
ROBERTS, HAMILTON H., The Electric Storage Battery Co., New York
ROCKETT, HAROLD C., Mechanical Engineer, Western Electric Co. New York
ROXBURY, WALTER R., Design Engineer, Western Electric Co., Inc., New York
SCHACHT, GEORGE E., Extension Division of Y. M. C. A., New York
SCHUMACHER, EDWIN F., Manager of Shop Division, Dunlap Tire & Rubber Corpn. of America, Buffalo
SERRELL, ALFRED T., Resident Machinery Inspector, City Island
SHANNON, JAMES F., Office Manager, Fred S. Carver, New York
SIMONS, SAMUEL S., Draftsman, Locomotive Superheater Co., New York
SNYDER, JAMES H., Draftsman, Selden Truck Corpn., Rochester
SPRAGUE, OSCAR V., Testing Engineer, Eastman Kodak Co., Rochester
STROMAN, CHARLES H., Watch Engineer, Elmira Water, Light and Railroad Co., Elmira
SULLIVAN, EDWARD J., Assistant to Superintendent, The American Sugar Refining Co., Brooklyn
SVENSSON, VICTOR A., Chief Draftsman, Ford Instrument Co., Inc., New York
THOMASON, LOUIS S., Mechanical Engineer, Shevlin Engineering Co., Inc., New York (Re-election)
WELCH, LEO T., Chief Engineer, Alpha Electric Construction Co., Albany

Ohio

BELKNAP, HARRY I., Mechanical Engineer, Development Department, Goodyear Tire & Rubber Co., Akron
CONRAD, WILLIAM A., Chemical Engineer, Grasselli Chemical Co., Cleveland
FREIBERG, JULIUS W., President, Ideal Concrete Machinery Co., Cincinnati
HOPKINS, SPENCER D., Production Engineer, The Pollak Steel Co., Cincinnati
KRING, SHELBY I., Sales Engineer, Ingersoll-Rand Co., Cleveland

Oklahoma

BROWN, CLARENCE L., Division Superintendent, Gasoline Department, Sinclair Oil and Gas Co., Tulsa

Pennsylvania

AIRSTON, ALEXANDER J., Assistant Engineer, Westinghouse Electric & Manufacturing Co., Lester
BLOM, AAGE G., Chief Draftsman, Macbeth-Evans Glass Co., Charleroi
BROWNBACK, HENRY L., Chief Engineer, Premier Motor Corpn. of America, Philadelphia
CLAUSEN, JENS, Chief Engineer, Harrisburg Pipe & Pipe Bending Co., Harrisburg
ESPY, WILLIAM N., Plant Engineer, Charleroi Works, Macbeth-Evans Glass Co., Charleroi
FORD, HARRY S., Manager, New York Office, R. H. Beaumont Co., Philadelphia
FRANCIS, HARRY, JR., Draftsman, Wm. Cramp & Sons, Philadelphia
GUTAI, JOHN A., Assistant Superintendent of Production, Ingersoll-Rand Co., Easton
LOHREN, JOHN C., Phoenix Portland Cement Co., Nazareth
RUDY, FRANK H., Sales Engineer, Elliott Co., Jeanette
SHERMAN, MAX C., President, The Sherman Engineering Co., Philadelphia
SWOBODA, HANS O., Consulting Electrical & Mechanical Engineer, Pittsburgh
TILDEN, SYDNEY G., Service Salesman, Hare's Motors Inc., Philadelphia

Rhode Island

CHICK, ALTON C., Instructor in Mechanical Engineering, Brown University, Providence
FILES, WILLIAM R., Treasurer & Manager, The Files Engineering Co., Inc., Providence
O'BRIEN, EUGENE W., Instructor in Engineering, Brown University, Providence

Texas

UDDEN, SVANTE M., Engineer, Tennant Lovegrove Co., Inc., Houston

Virginia

TERRY, ROGER V., Newport News Shipbuilding & Dry Dock Co., Newport News

Washington

DOLE, CHARLES E., General Purchasing Agent, Alaskan Engineering Commission, Seattle
SNEDDEN, ARCHIE D., Chief Engineer, Spokane Central Heating Co., Spokane

Wisconsin

BIEVER, EDMUND J., Chief Engineer, Montana Tractor Co., Oconto
BROBACK, J. IRVIN, Rex Chain Belt Co., Milwaukee
LICHTENBERG, ERICH H., Chief Engineer, Koehring Machine Co., Milwaukee
SANS, FRED V., Sales Engineer, Allis-Chalmers Manufacturing Co., Milwaukee
SCHUBERT, WILLIAM E., Test Engineer, The Milwaukee Electric Railway & Light Co., Power Plant Department, Milwaukee

Canada

COOK, ARCHIBALD S., Assistant Mechanical Superintendent, Price Bros. & Co., Ltd., Kenogami, P. Q.
BURROUGHS, CHARLES W., Consulting Engineer, Chas. W. Burroughs, Montreal, Que.
DREWITT, GEORGE E., General Manager, Federal Coals, Ltd., Lethbridge, Alberta
EDKINS, ALBERT E., Chief Inspector, Boiler Inspection & Insurance Co. of Canada, Toronto, Ont.
WARDMAN, LEONARD W., Sales Engineer, Messrs. Goldie & McCulloch Coy, Galt, Ont.

China

HORNE, ALEXANDER, Chief of Engineering Department, Fobes Co., Ltd., Shanghai

India

BHAPPU, KAVASJI K., Managing Partner, Crystal Ice & Cold Storage Co., Karachi
GUHA, KAMINI K., Assistant Engineer, Sanitary Division, Public Works Department, V. P. (Re-election)

South America

COLLINS, FRANK W., Mechanical Engineer, Cerro de Pasco Copper Corpn., La Orova, Peru
HAILE, WILLIAM A., Sales Manager, Worthington Pump and Machinery Corpn., Rio de Janeiro, Brazil
WELCH, EDWIN A., Engineer, Sales Department, Baldwin Locomotive Works, Buenos Aires, Argentine

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Louisiana

CARR, EDWARD W., JR., President, E. W. Carr, Inc., New Orleans

Pennsylvania

LADD, GEORGE T., President, The George T. Ladd Co., Pittsburgh

PROMOTION FROM ASSOCIATE-MEMBER

District of Columbia

PELOT, JOSEPH H., Chief Ammunition Division, Ordnance Department, United States Army, Washington

Kansas

BATEMAN, PAUL, Manager, The Peoples Tank Line Co., Coffeyville

Louisiana

BURBANK, EDWARD W., Sales Engineer, Allis-Chalmers Manufacturing Co., New Orleans

Michigan

LITTLE, EDWIN R., President, The E. R. Little Co., Inc., Detroit

Missouri

GROTE, HENRY C., Planning Engineer, Monsanto Chemical Works, St. Louis

New York

BRYAN, A. C., Vice-President and Factory Manager, Durston Gear Corpn., Syracuse
MILLER, JOHN H., Chief Draftsman and Field Engineer, Robert Sayre Kent, Inc., Brooklyn

Pennsylvania

LECHLER, BRUNO C., Manager, Sugar Machinery Department, Fletcher Works, Philadelphia

Wisconsin

GREAGAN, JOHN J., Sales Engineer, Allis-Chalmers Manufacturing Co., Milwaukee

Canada

WATSON, McCLELLAND B., Director, Department of Engineering, Technical Schools, Toronto, Ont.

PROMOTION FROM JUNIOR

California

BARUCH, MILTON, Chief Engineer, Llewellyn Iron Works, Los Angeles

Connecticut

DAY, IRVIN W., Vice-President, The Connecticut Light & Power Co., Waterbury

Illinois

KNIESE, HAROLD G., Construction Engineer, Central Illinois Light Co., Peoria
PARKER, FRANCIS W., JR., Member of Firm, Parker & Carter, Chicago

Louisiana

HOOD, J. RILEY, Sales Engineer, York Engineering and Supply Co., New Orleans
ROGERS, CHARLES M., President, The Rogers-Higgins Co., Inc., New Orleans

New Jersey

LYNCH, FRANCIS J., General Manager, Peerless Tube Co., Bloomfield
SCHUBERT, FRANK H., Sales Engineer, Wheeler Condenser & Engineering Co., Carteret

New York

ARMACOST, WILBUR H., Engineer, Locomotive Superheater Co., New York
BACHELDER, JOSEPH E., Manager, Pump & Marine Sales Department, Fairbanks, Morse & Co., New York
ENNIS, HERBERT V., Assistant Chief Estimator, American Car and Foundry Co., New York
HATHEWAY, PHILIP M., Acting Chief Engineer, National Lead Co., Brooklyn
ROVER, RICHARD H., Works Engineer; Power Specialty Co., Dansville
SCHALLER, ALWIN, General Manager & Secretary, McEwen Bros., Wellsville

Ohio

BANKS, THOMAS D., Superintendent Power Plants, Ohio State University, Columbus

Pennsylvania

DICKSON, THOMAS J., Assistant to Works Engineer, Fels & Co., Philadelphia

South Carolina

THORNHILL, THEODORE W., President, Charleston Oil Co., Charleston

Utah

LILLIE, GRANT W., Bingham and Garfield Railway, Garfield

Australia

PRICE, NORMAN I., Senior Partner, Price Martyn & Co., Sydney

Canada

FRIEDMAN, FERDINAND J., Montreal P. Q.

Japan

MILNER, BERT B., Railway Sales Engineer, Sale & Frazar, Ltd., Tokyo

South America

CORLETTE, GLEN H., Manager, Branch of Fairbanks, Morse & Co., Buenos Aires, Argentine

SUMMARY

New Applications	175
Change of Grading:	
Promotion from Associate	2
Promotion from Associate-Member	10
Promotion from Junior	22
Total	209

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Abridged List of Officers and Committees

1921

OFFICERS AND COUNCIL

President

Edwin S. Carman

Past-Presidents

Members of the Council for 1921

Fred J. Miller — Charles T. Main
M. E. Cooley — Ira N. Hollis
D. S. Jacobus

Vice-Presidents

Terms Expire December 1921

William B. Gregory — Robert H. Fernald
Edward C. Jones

Terms Expire December 1922

Leon P. Alford — John L. Harrington
Robert B. Wolf

Managers

Terms Expire December 1921

Charles L. Newcomb — C. Russ Richards
Frank O. Wells

Terms Expire December 1922

Elbert C. Fisher — Earl F. Scott
Dexter S. Kimball

Terms Expire December 1923

Louis C. Nordmeyer — Henry M. Norris
Carl C. Thomas

Treasurer — William H. Wiley

Secretary — Calvin W. Rice

Director of Library

Harrison W. Craver

Executive Committee of Council

L. P. Alford — D. S. Jacobus
D. S. Kimball — Fred J. Miller
Edwin S. Carman, *Chairman*

Chairmen of Standing Committees of Administration have a seat in the Council without vote.

STANDING COMMITTEES

ADMINISTRATION

Chairmen

Finance, Erik Oberg
Meetings and Program, Royden V. Wright
Publication and Papers, George A. Orrok
Local Sections, William H. Kenerson
Professional Sections, Edwin B. Katte
Membership, R. F. Jacobus
Constitution and By-Laws, John L. Harrington
Library (To be appointed)
Education and Training:
- Relations with Colleges (To be appointed)
- Training for the Industries, W. W. Nichols

Awards and Prizes, Walter M. McFarland

PROFESSIONAL

Chairmen

A.S.M.E. Boiler Code, John A. Stevens
Sub-Committees:
- Air Tanks and Pressure Vessels
- Boilers of Locomotives
- Conference Committee to confer with Association of American Steel Mfrs.
- Conference Committee to confer with American Society of Heating and Ventilating Engineers, Heating Section
- Conference Committee to confer with Executive Committee of American Society for Testing Materials
- Miniature Boilers
- Rules for Inspection
- Specification Steam Piping, Valves, Fittings in Code
- Welding
- Conference Committee to confer with Committee on Welding, American Welding Society
- Conference Committee to confer with Committee on Welding, American Society of Refrigerating Engineers

A.S.M.E. Power Test Codes, Fred R. Low
Individual Committees on:
- General Instructions
- Definitions and Values
- Fuels
- Boilers
- Steam Engines
- Steam Turbines
- Reciprocating Displacement Pumps
- Centrifugal and Rotary Pumps
- Displacement Compressors and Blowers
- Centrifugal and Turbo-Compressors and Blowers
- Complete Steam Power Plants
- Condensers, Water Heating and Cooling Equipment
- Refrigerating Machines and Plants
- Evaporating Apparatus
- Locomotives
- Gas Producers
- Internal-Combustion Engines
- Hydraulic Power Plants
- Instruments and Apparatus

Research, Arthur M. Greene, Jr.
Sub-Committees:
- Bearing Metals
- Cutting Action of Machine Tools
- Fluid Meters
- Heat Transmission
- Lubrication
- Permanency and Accuracy of Indication of Engineering Instruments
- Present State of our Knowledge of Riveted Joints
- Vibration of Shafting

Standardization, E. C. Peck
Screw Threads and Threaded Parts, E. M. Herr
Technical Nomenclature, W. D. Ennis
Weights and Measures, L. D. Burlingame

SPECIAL COMMITTEES

ADMINISTRATION

Regular Nominating Committee, 1921, G. K. Parsons, *Chairman*, W. M. White, *Secretary*
Tellers of Election, 1921, H. G. Tyler, *Chairman*

PROFESSIONAL

Chairmen

Protection of Industrial Workers, John W. Upp
Standardization of Steel Roller Chains (Joint with S.A.E.), C. H. Benjamin
Flanges and Pipe Fittings, A. R. Baylis
Tolerances in Screw Thread Fits, L. D. Burlingame
International Standard for Pipe Threads, E. M. Herr
Foreign Relations, Ambrose Swasey, W. F. M. Goss, Chas. T. Main
Code of Ethics, A. G. Christie

SOCIETY REPRESENTATION

American Association for the Advancement of Science, Section on Engineering
American Engineering Council of Federated American Engineering Societies
American Engineering Standards Committee:
- Plain Limit Gages for General Engineering Work
- Small Tools and Machine Tool Elements
- Gears: Spur, Bevel, Worm and Sprocket
- Standardization and Unification of Screw Threads
- Ball Bearings
- Bolt, Nut and Rivet Proportions
- Mechanical Transmission
- Logging and Sawmill Machinery
- Power Presses
- Paper and Pulp Mills
- Grinding Machinery
- Standardization of Shafting

Classification of Technical Literature Committee
Employment Bureau (under auspices of the F.A.E.S.). Manager, Walter V. Brown
Engineering Foundation Board
Franco-American Engineering Committee
Graphic Presentation, Standards for
John Fritz Medal Board of Award
Joseph A. Holmes Memorial Association
International Corresponding Committee on Screw Threads
International Standard for Pipe Threads
National Research Council, Engineering Division
Board of Trustees, United Engineering Society
Library Board, United Engineering Society
Western Society of Engineers, Washington Award

LOCAL SECTIONS

Chairmen and Secretaries

Akron, Frank O. Ellenwood, L. Ochtman, Jr.
Atlanta, N. C. Harrison, R. S. King
Baltimore, H. D. Bennett, A. G. Christie
Birmingham, F. G. Cutler, John A. Sirmit
Boston, Elmer Smith, D. K. Dean
Buffalo, B. S. Hughes, W. W. Boyd
Central Pennsylvania, A. J. Wood (temporary), (Secretary to be appointed)
Chicago, H. S. Philbrick, J. D. Cunningham
Cincinnati, J. A. Pollak, J. T. Faig
Cleveland, J. H. Herron, C. H. Day
Colorado, T. L. Wilkinson, William Lester
Columbus, W. T. Magruder, Arthur Richards
Connecticut State, Edwin Pugsley, Jr., C. K. Decherd
- Bridgeport, Ernest Gledhill, James Coulter
- Hartford, S. F. Jeter, A. W. Honywill, Jr.
- Meriden, C. K. Decherd, Frank L. Rowntree
- New Haven, Edwin Pugsley, Jr., E. H. Lockwood
- Waterbury, Hugh L. Thompson, J. R. Putnam

Detroit, Ralph Collamore, E. S. Reid
Eastern New York, J. L. Hughes, R. O. Alden
Erie, E. H. Kendall, J. St. Lawrence
Houston, F. C. Smith, H. W. Fletcher
Indianapolis, Charles Brossman, E. H. Mavo
Lehigh, A. T. Keller, T. E. Butterfield
Los Angeles, H. L. Doolittle, R. W. Lacy
Metropolitan New York, W. S. Finlay, Jr., H. H. Barnes, Jr.
Mid-Continent, H. D. Cornell, D. E. Foster
Milwaukee, Charles A. Cahill, F. H. Dorner
Minnesota, D. W. Flowers, Albert Buenger
New Orleans, E. W. Carr, W. B. Moses
Ontario, C. B. Hamilton, M. B. Watson
Oregon, John Dickson, S. H. Gray
Philadelphia, H. P. Liversidge, Charles Penrose
Pittsburgh, S. B. Ely, K. F. Treschow
Providence, James A. Hall, J. D. Guillemette
Rochester, J. F. Ancona, F. A. Collins, Jr.
Spokane, Foster Russell (temporary), (Secretary to be appointed)
St. Louis, E. W. Schadek, Kurt Toensfeldt
San Francisco, W. W. Hanscom, E. A. Rogers
Syracuse, E. M. Mackie (acting), L. J. Schuyler
Toledo, J. B. Nordholt, Loring Freed
Tri-Cities, C. L. Adams, E. Ransom Jackson
Utica, Hubert E. Collins, B. E. White
Virginia, E. W. Farley, A. H. Ware
Washington, Geo. A. Weschler, A. R. Cheyney
Washington State, W. L. Newell, E. O. Eastwood
Worcester, E. Howard Reed, William Bacon

PROFESSIONAL SECTIONS

Chairmen and Secretaries

Aeronautics, Joseph A. Steinmetz, Edwin E. Aldrin
Cement, F. W. Kelley (temporary), (Secretary to be appointed)
Fuels, L. P. Breckenridge, M. S. Hutton
Gas Power, George A. Orrok (temporary), (Secretary to be appointed)
Management, L. P. Alford, W. H. Greul
Machine Shop, F. O. Hoagland, H. P. Fairfield
Materials Handling, R. M. Gates, (Secretary to be appointed)
Ordnance, C. F. Hirshfeld (temporary), (Secretary to be appointed)
Power, A. D. Bailey, C. W. Wilder
Railroad, E. B. Katte, James Partington
Textiles, C. T. Plunkett, Geo. H. Perkins

The Chairmen of the Professional Sections constitute the Standing Committee on Professional Sections.

In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers. Publication Office 207 Church St., Easton, Pa. Headquarters of the Society, 29 West 39th St., New York

Vol. 43, No. 5 — A.S.M.E. AFFAIRS — May, 1921

COUNCIL IS GUEST OF BOSTON SECTION

Program Includes Dinner to John A. Stevens and Meeting with Local Societies

A complimentary dinner to Mr. John A. Stevens, leader of the A.S.M.E. Boiler Code Committee, and an all-day meeting with the Boston Local Section and with the local engineering societies, constituted the program of the visit of the Council to Boston, Tuesday and Wednesday, March 22 and 23.

There were present: President Edwin S. Carman, presiding; Vice-Presidents L. P. Alford, Robert B. Wolf, Wm. B. Gregory; Managers D. S. Kimball, F. O. Wells, H. M. Wells, E. F. Scott, C. L. Newcomb; Past-Presidents F. J. Miller and C. T. Main; Chairmen of Standing Committees: G. A. Orrok, Publication and Papers; John L. Harrington, Constitution and By-Laws; Wm. H. Kenerson, Local Sections; Geo. F. Perkins, representing Professional Divisions; Secretary Calvin W. Rice; and Assistant Secretaries Wm. E. Bullock and Ernest Hartford. In response to the general invitation to attend Council meetings the following committeemen were present: S. B. Ely, and J. H. Herron, Local Sections Committee; C. E. Gorton, F. W. Dean, James Partington, F. R. Low, C. E. Bronson, C. W. Obert, Boiler Code Committee; Elmer Smith, and A. S. Kellogg, Boston Section; and Harry S. Echternach, Safety Engineer of the Commonwealth of Pennsylvania, guest of the Boiler Code Committee.

The Standing Committees on Local Sections and on Boiler Code met on March 22 and transacted important business recorded elsewhere.

Constitution and By-Laws to be Revised

Action on Constitution and By-Laws. Chairman Harrington reported for his Committee that the laws under which the Society is operating are deficient in providing for many of the new activities and that furthermore the documents need a general revision to unify amendments made from time to time. The Council requested the Committee to present, at the Spring Meeting, a proposed revision of the Constitution and By-Laws in accordance with article C 57. Any members of the Society having suggestions are invited to send them to the Secretary.

Annual Meeting Plan Changed. On the recommendation of the Meetings and Program Committee a change is being made in the By-Laws to enable the Annual Meeting, after the election of officers, which must be held in the City of New York, to be adjourned to any other place. This will give more scope to the Spring Meeting which, under the new plan, can always be held in the South or West, the East being taken care of by the Annual Meeting.

Code for Boiler Locomotives Accepted

Locomotive Boiler Code. After three and a half years' work of the Sub-Committee the Council accepted and approved the report on Boilers for Locomotives, which puts into effect an important addition to the series of codes planned by the

(Continued on page 55)

DETAILS OF
A.S.M.E. SPRING MEETING
will be found on pages 352-353
of Section One

EVENTS ARE SCHEDULED AT
McCook Field, Dayton, May 21
Congress Hotel, Chicago, May 23-6
Rock Island Arsenal, May 27-28

GREAT LAKES MEETING PLANNED FOR JUNE 13-14

Local Sections and Engineering Clubs to Unite in Regional Sessions

Under the auspices of the National Committee on Local Sections, what is to be called a Great Lakes Regional Meeting has been planned to take place on June 13-14, at Cleveland, Ohio, and the following Local Sections and Engineering Clubs in their respective cities have been invited to participate: Akron, Buffalo, Chicago, Cincinnati, Columbus, Detroit, Erie, Rochester, Toledo, Indianapolis, Ontario, Pittsburgh, and the Engineering Society of Dayton.

It will be recalled that the Society has already held one or two successful joint Local Section meetings, but nothing so pretentious as this forthcoming meeting has as yet been attempted.

There has long been a feeling that one general meeting of the Society a year other than the Annual Meeting is insufficient. Therefore, the Local Sections' Committee has been working to develop regional meetings of Local Sections, which have possibilities of being as representative and worth while as are Spring Meetings, promoting acquaintanceship and giving opportunities for interesting technical sessions.

CHOICE OF F.A.E.S. DELEGATES TO FALL ON VOTING MEMBERS

Plans are under way for the regular Nominating Committee to make nominations annually to fill the vacancies on our Society's delegation on the American Engineering Council in the same way that the officers of the Society are nominated. This will be done simply by the regular Nominating Committee presenting to the Secretary, at the same time that it furnishes the regular ticket, a list of its candidates for the vacancies in the delegation; these will then be balloted on by the voting membership just as the regular officers are.

The Council feels that this procedure will give considerable standing to our Society's delegation on the Federation and that at the same time the election of our representatives will be conducted in the most democratic manner possible, the responsibility for the personnel of our delegation being placed entirely in the hands of the voting membership.

(Continued on page 55)

STEADY PROGRESS IN PROFESSIONAL DIVISION ACTIVITY

Management, Forest Products, Ordnance and Fuels Divisions Now Well Under Way

It will be noted that the term "Professional Sections" is being changed to "Professional Divisions." This will avoid confusion with Local Sections, which are colloquially referred to as Sections.

Professor Breckenridge Honored by Professional Divisions

By unanimous vote of the Standing Committee on Professional Divisions, Prof. L. P. Breckenridge has been elected Vice-Chairman of the Standing Committee. He serves on this Committee by virtue of his chairmanship of the Fuels Division. Professor Breckenridge is widely known as an educator and as an expert on fuel and power subjects. He has been very active in the Professional Divisions from their inception. He is a member of the Committee on Superpower Survey.

Management Division's Executive Committee Has Regular Schedule

The Executive Committee of the Management Division has adopted a schedule of meeting the first Monday in each month except July and August.

At the April meeting of the Committee the program for the Management Session at the Spring Meeting was adopted. This will include a tentative report from the Joint Committee on Management Terminology, on which are coöperating the Industrial Relations Association of America, National Association of Cost Accountants, Society of Industrial Engineers, The American Institute of Accountants, and the Taylor Society.

The Division has been offered a number of papers on management topics, which the Committee will be glad to place at the disposal of the Local Sections, subject to the ability of the authors to meet any desired dates. Any members having constructive papers or subjects for Division activities are requested to communicate with the Division's Secretary, Mr. W. Herman Greul, 10 East 39th Street, New York City.

Forest Products Division Starts with 160 Members

The Council has now authorized the Forest Products Division, and the Organizing Committee, Mr. Thomas D. Perry, Chairman, will canvass the membership of the Division to elect the Executive Committee. The Division is to hold a Session at the Spring Meeting in Chicago and the organization will probably be effected there.

Phases of the subject to be included in the activities of the Division are Wood Preservation, Paper Pulp, Lumber Manufacture, Furniture, Management, Education, Vehicles and Musical Instruments.

Ordnance Division Executive Committee Elected

As the result of the letter-ballot of this Division, conducted by the Organizing Committee, consisting of Major F. C. Bull, Mr. Ralph G. Macy, Major E. L. Sherwood, and Mr. F. E. Town, the following have been elected as the Executive Committee: Mr. Waldo H. Marshall, Chairman, Lt-Col. G. L. Wall, Major Wilford J. Hawkins, Major Fred J. Miller and Major E. L. Sherwood, Secretary.

The big coming event of the Division is the meeting to be held at Rock Island Arsenal immediately following the Spring Meeting. The technical program is in charge of the Ordnance Division. The Army Ordnance Association is participating and the official invitation for the meeting was issued by the Chief of Ordnance of the United States.

Gas Power Division Executive Committee Elected

Van H. Manning, *Chairman*, Finley R. Porter, Lawrence B. Jackson, B. P. Flint and R. H. Burdick have been elected as the Executive Committee of the Division with W. D. Ennis as *Secretary*. The Division is planning no event for the Spring Meeting, but hopes to have a session at the 1921 Annual Meeting.

Professional Divisions Developing Affiliate Members

An application form for Affiliates and a form of membership card have been adopted by the Standing Committee on Professional Divisions and are being printed.

Briefly, the requirements are that the applicant for affiliateship in any Division shall fill out a form similar to the form for membership in the Society proper, giving three members as references, and shall pay an annual fee of $10 for each Division which shall include a subscription to MECHANICAL ENGINEERING.

Any member of the Society may propose any one for this class of membership and the Secretary of the Society will be glad to provide the necessary forms.

EACH LOCAL SECTION TO HAVE FUELS COMMITTEE

The formation of Fuels Committees under the auspices of each of the local sections of the Society has been undertaken by the Fuels Division. To each of the chairmen of the local sections was sent a letter in the form of a questionnaire signed by the members of the executive committee of the Division, also a communication from Prof. L. P. Breckenridge outlining some of the activities which could be undertaken by the local Fuels Committees. Before sending the above, permission was obtained from the Local Sections Committee of the Society. In the questionnaire the chairman was asked (1) to name the leading authorities on fuels in his section, (2) to give a list of the forthcoming meetings on fuel subjects, and (3) to recommend five members in the section who could constitute a local committee on fuels and assist in the program of the Fuels Division. To the Division's Committee on Membership has been assigned the task of aiding in the formation of these local committees. Among the activities which the local committees could undertake are the following: (*a*) Having fuel meetings each year in which local organizations could be asked to participate; (*b*) furnishing speakers, if desired, for the meetings of local organizations of engineers; (*c*) giving civic authorities help in stimulating fuel economy and informing the local press of facts about the elimination of unnecessary waste. Besides this the committees can be of service to the Division by (*d*) tabulating fuel facts and performances in its vicinity and sending them to the Committee on Information, also (*e*) by obtaining speakers for the fuel sessions at the Annual and Spring Meetings of the Society.

The Division expects to have a very interesting session at Chicago, and it earnestly hopes that there will be a large attendance of the members.

MANCIUS S. HUTTON,
Secretary Fuels Division, A.S.M.E.

MATERIALS HANDLING DIVISION OUTLINES OBJECTS AND SCOPE

Questionnaire Being Sent to Division Members to Assist in Committee Organization

The Aims and Organization Committee of the Materials Handling Division of the A.S.M.E. has recently submitted to the Executive Committee of the Division a report giving the objects of the division, the scope of its activities and an outline of how the problem is to be approached. Material handling, it is stated, is largely a mechanical-engineering problem divided into two parts: First, the consideration of the detailed design and operation of mechanical equipment for handling material, and, second, the economical and efficient application of this equipment in the arts and industries. The purpose of the Materials Handling Division is to organize, direct and promote these two objects. The report gives the following specific

Objects of the Division

a To coördinate and correlate existing data and information, to find the gaps in the knowledge so as to bridge them, and to render the sum total available to the greatest possible number;

b To develop the science and economics of material handling in conjunction with and in coöperation with all other logically associated organizations;

c To work toward standardization of methods and designs wherever feasible and possible with the belief that such standardization will reduce costs of handling materials;

d To promote actively the discussion of material handling in all its economic and engineering phases to the end that it may take its rightful place in future engineering thought and opinion;

e To point out the economic wastes of duplication of effort, of manual labor, and of undirected and unplanned material handling in all its phases;

f To aim to correlate the work of all engineers in material handling;

g To coöperate with other professional divisions of the Society or other associations and organizations;

h To initiate and aid research;

i To assist in solving national, state and community handling problems; and

j To establish an Information Division which would be prepared to furnish such information as a compendium of all devices now on the market, a list of references classified under material handling.

What is Material Handling?

The scope of the activities of the Division is defined as follows: Material handling in this Division is concerned only with what may be called the problems of secondary transportation of materials and commodities. It does not concern itself with the broad transportation problems of the common carriers, or the tributaries to common carriers, such as organized highway trucking systems, interurban freight lines, and so on. Material handling has to do with the multitudinous operations of "picking up and putting down" materials in process of production, and the handling problems of the linkages between common carriers and delivery to the user.

The objective in any material-handling problem is the reduction of costs. The Professional Division therefore, will approach the problem in general and will (1) make a survey of the existing industry to ascertain the present state of the art; (2) make studies for the improvement of machinery and equipment for the handling of materials; and (3) ascertain ways and means of reducing costs.

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THE SECRETARY'S LETTER

Individual Responsibility, Economy, Thrift and Industry Will Alone Bring Prosperity

The conspicuous characteristic of the inaugural address of the President of the United States was the announcement that success depends upon the efforts of each individual.

Since determining to discuss in this letter the peculiar opportunity and responsibility of the engineer, of all citizens, due to his special fitness, I have chanced to read an address by Dr. Gunsaulus, former President of the Armour Institute of Technology of Chicago. The occasion was a comparatively short time before his recent untimely death. I had known of him all my life, but almost entirely as a minister of the gospel and lecturer. Due to this I am the more impressed with his appeal to the engineer "for handicraft" as "a plea for patriotism"—"It is a defense . . against flaccid, brainless, horn-blowing Americanism."

Mr. Hoover has recently stated that the lower living standards in the Old World accentuated and enforced by the war can only result in lowered manufacturing costs in all articles with which we are to compete in the world's markets. Already Germany has underbid American locomotive builders by $3000 each on engines for Java and Sumatra. We think we have been going through trying times, but we may be sure that the future will continue to present trying situations.

It has been the habit of mind of all citizens, including engineers, to believe that their difficulties are going to be solved by the new administration rather than by themselves; to defer even thinking—that somehow, as by magic, Mr. Harding and his cabinet, even with a Hoover, are going to bring prosperity, and that all we have to do is to wait and it will come to us.

Gladstone asked an audience on one occasion to define an empire, and then immediately answered his own question by saying, "An empire is made by the people."

The first thing needed is personal economy—not of the father alone, but of the mother, son, and daughter—accompanied by greater individual industry. Each person must consume less and produce relatively more. In this deflation period money is going to be relatively more dear. Examples of economy, thrift and industry must be set by the engineers as executives if they are to be caught by working people generally.

We engineers must make it possible for the Government to economize so as to reduce taxes. We can only do this by giving the Government the benefit of our special training, not as office seekers but as servants of the people, and in the most helpful and at the same time unpretentious manner. We have made a most flattering success of our movement for a department of Public Works; let us follow that up with other thoughtful measures.

CALVIN W. RICE, *Secretary*.

BOSTON ENGINEERS HAVE TWELFTH ANNUAL DINNER

The Twelfth Annual Dinner of the Engineers of Boston was held at the City Club on March 9, bringing together the A.S.M.E. Section with the other engineering societies of Boston. Lewis E. Moore, bridge engineer of the State Department of Public Works, was toastmaster and Edward J. Mehren, editor of the *Engineering News-Record*, whose topic was An Engineer's View of the Economic Conditions in Europe, told of his recent trip abroad. Rev. Mellyar H. Lichliter, of Newtonville, Mass., discussed certain sociological tendencies under the topic The Vaudeville Mind. The possibilities of aerial photography in engineering work were presented by stereopticon views through the courtesy of the American Air Service Corp. Charles L. Newcomb officially represented the Society.

CENTRAL PA. SECTION TO HAVE BIG MAY MEETING

The Central Pennsylvania Section of the A.S.M.E. will hold its Spring Meeting on May 21 at State College, Pa., with headquarters at the University Club. There will be two sessions—at 10 a.m. and 1.30 p.m.—and the speakers will include Dr. Ira N. Hollis to speak on The Engineer's Duty in Eliminating the National Waste, Dean R. L. Sackett of the Pennsylvania State College whose address will be on New Opportunities for the Engineer, and Major Fred J. Miller who will speak on The Engineer's New Duties.

This meeting has been set for May 21 to enable members on their way to Chicago to attend. Those leaving Philadelphia or New York on the evening of the 20th, may reach State College via Tyrone by 9.30 the next morning, and may leave the latter place at 4 p.m. in the afternoon, arriving at Chicago on the following morning of May 22.

The program will include a description and inspection of the new $150,000 mechanical engineering laboratory and of the heat-transmission work at the college's thermal testing plant. There will be a review of investigations now in progress or proposed in Central Pennsylvania at the Professional Session. Lunch will be served at the University Club at 12.30 and following the afternoon session members may attend the baseball game between the University of Detroit and Penn State. For further particulars regarding train connections and program, address Major J. W. Henszey, Chairman, Program Committee, State College, Pa.

COUNCIL IS GUEST OF BOSTON SECTION

(Continued from page 53)

Boiler Code Committee. The Sub-Committee was accorded the thanks and appreciation of the Council for its painstaking work. The Boiler Code Committee also reported interpretations Nos. 324, 328, 329, 331, 332, 333, 334, 338, 339, 340 and 341, which were approved and ordered published in MECHANICAL ENGINEERING as heretofore.

Professional Divisions. To avoid confusion with the term "sections," which is often applied to Local Sections, the machinery was put in motion to change the term "Professional Sections" to "Profession Divisions." This entails a change in the By-Laws only and can be completed at the next meeting of the Council.

On the recommendation of Mr. Thomas D. Perry, supported by 143 members of the Society, the Council accepted a petition for a Forest Products Division. It will be recalled that a Committee on Woodworking conducted a successful session at the last Annual Meeting and the new Division is the outcome. The Division plans to conduct a session at the forthcoming Spring Meeting in Chicago.

The Management Division reported a joint committee on Management Nomenclature with the following societies participating: The Taylor Society, the Society of Industrial Engineers, The American Industrial Relations Association, The National Association of Cost Accountants, and The American Institute of Accountants.

Local Sections. The former Washington State Section was divided into the Western Washington Section and the Inland Empire Section. A full account of these activities appear under "Local Sections."

Relations with Colleges. The Committee on this activity was asked to call together the members of the Student Branches from the other national societies to consider a plan of uniform action with the colleges.

Committee Appointments. D. M. Ferris, Wm. H. Kenerson, M. L. Cooke, H. G. Tyler and Roger M. Freeman, were appointed as a Committee on Relations between Junior and Student Members; and E. N. Trump, F. A. Halsey, Albert W. Smith, Ambrose Swasey and F. G. Tallman as a committee to prepare the biography of John A. Sweet.

Past-President D. S. Jacobus was reappointed as one of the Society's representatives on the Engineering Division of the National Research Council.

Carl B. Auel, was appointed on the Safety Code for Mechanical Transmission of Power. Stanley G. Flagg, Jr., as one of the Society's representatives on American Engineering Standards Committee, and Frank L. Fairbanks as A.S.M.E. representative on the New Advisory Board of the American Bureau of Welding.

American Engineering Council. On the recommendation of the Chairman of the Society's delegation, Mr. L. P. Alford, it was voted that hereafter the vacancies be filled by election by the voting membership in the same manner that the regular officers of the Society are elected. An article on this subject appears elsewhere in this issue.

Council to Visit Mobile. The Council adjourned to meet at the Battle House, Mobile, Ala., on Friday, April 22, at 8 a.m.

CALVIN W. RICE, *Secretary.*

HOW THE FINANCE COMMITTEE HANDLES ITS MANY PROBLEMS

Cost of Publications and Joint Obligations Call for Two Budgets Yearly

In the normal times which used to prevail, the budget of estimated income and expenditures need be considered only once a year, fairly accurate forecasts being then possible. But with present conditions, to be safe, practically two budgets have to be made a year, each requiring considerable thought on the part of the committees in charge of the several activities, then of the Finance Committee, and finally of the Council.

It might be interesting to members to know just how these budgets are made up, that they may judge how much responsibility rests upon the committees that all may share in it, and that those especially familiar with the handling of financial matters may take the initiative—always welcomed, especially so now—in offering suggestions.

In the first place, with the still prevailing high manufacturing costs of all printing (and the notice that there may be a 12 per cent increase on May 1), it requires serious thought to make "ends meet" and the chief concern in making up the budget is how *best* to distribute the available money, for at current costs there is far less money available than committees could use advantageously.

An additional burden this year has been the estimating of the income. Every member knows that no small part of his returns from the Society are made possible by the advertising activities, and it is also common knowledge that the present business depression has been accompanied by general curtailment of advertising. No part of the income from advertising is profit to any one, nor is it used for the running of the Society. It is devoted solely to the development of MECHANICAL ENGINEERING to make it invaluable to every mechanical engineer.

Expenses that must be incurred each year are those to secure the income. It costs money to collect the dues, to put through new members, to publish the Transactions and Year Book given each member.

The Society has assumed a number of obligations jointly with the other societies in the Engineering Societies Building. These are the maintenance of the building itself, the Library, the American Engineering Standards Committee, and recently the Federated American Engineering Societies. All these activities are for the good of the whole profession, as well as for the benefit of our own membership.

The publications—the text of MECHANICAL ENGINEERING, the Transactions, the Year Book—are important obligations, as are also the General Meetings and the Local and Professional Sections. All of these find their usefulness, and the consensus of opinion at the meeting of the Local Section delegates at the last Annual Meeting was that they should be maintained—though necessarily restricted slightly so as to insure current income taking care of current expenditures.

A study of the activities the Society undertakes gives an indication of how far the resources have to go, and enable members to judge the problems which confront those who have the responsibility of deciding how best to distribute the Society's income.

MATERIALS HANDLING DIVISION OUTLINES OBJECTS AND SCOPE

(Continued from page 54)

In subdividing the committee activities prime consideration will be given to the two sets of problems in the field of the Materials Handling Division: (1) the technical problems of the industries, and (2) the commercial fields of material-handling machinery. These two main divisions may be subdivided in many different ways, depending on the problem involved. By appointment of committees functioning under the executive committee of the Division and coordinated with the general committee, a very flexible plan of organization is afforded which may be enlarged or contracted to meet conditions.

To assist in the organization of committees a questionnaire in the form of a classification list is being sent to the members of the Division, giving them an opportunity to indicate in what particular features of the material-handling problem they are interested. Only such subcommittees on industry, application and design of equipment as are warranted by the interest and support of the Division membership will be formed.

CHOICE OF F.A.E.S. DELEGATES TO FALL ON VOTING MEMBERS

(Continued from page 53)

The Society has one representative for every thousand members, and by January 1 next year, it is estimated that our delegation will number fifteen. The representatives serve for two years, one-half retiring each year.

Provision is being made for the President-elect of the Society to be a member of the delegation, and in the second year of his service for him to be its chairman. A vice-chairman will also be nominated each year, and the delegation will elect its own secretary, who will cooperate closely with the Secretary of the Society.

ENGINEERING FOUNDATION ISSUES ANNUAL REPORT

The annual report of the sixth year of Engineering Foundation reviews the progress of the work in hand and outlines the projects in view. The Foundation has continued to work in close cooperation with the Division of Engineering of the National Research Council. One of the chief studies during the past year has been that on the Fatigue Phenomena of Metals carried on under the direction of Prof. H. F. Moore at the Engineering Experiment Station of the University of Illinois. A full account of this work and other activities of the Foundation will be found in the complete report, copies of which may be obtained from Alfred D. Flinn, secretary of the Foundation, 29 West 39th Street, New York City.

Recent Section Meetings

Regional Meeting in the South, Atlanta-Birmingham-New Orleans. April 22. Joint meeting at Mobile, Ala., attended by A.S.M.E. Council and the Local Sections Committee. National officers also visited Birmingham and Atlanta en route to Mobile, and New Orleans and Cincinnati Sections on return trip.

Akron. April 27. Joint meeting with the Engineering Society of Akron. Dr. D. S. Jacobus of the Babcock & Wilcox Co. addressed meeting.

Atlanta March 29. Subject: Designs of Super-Power Plants, by John A. Stevens, of Lowell, Mass.

Baltimore. March 31. Subject: Development of Central Stations, by George A. Orrok, of N.Y.C.

Birmingham. April 1. Subjects: Designs of Super-Power Plants, by John A. Stevens, of Lowell, Mass.; Early Days in the By-Product Plant Operation, by F. Tschudy, of the By-Product Plant, Fairfield, Ala.

Boston. March 12. Annual dinner of Boston Engineers. See special account page 54 of this section.

March 23. Joint meeting of A.S.M.E. of Boston and Worcester, A.I.E.E. of Boston and Harvard Engineering Society. Subject: Internal-Combustion Engines, by Dr. Charles E. Lucke, of Columbia University, N.Y.C. President Carman also spoke at this meeting and A.S.M.E. Council and Committee on Local Sections attended in a body.

Cincinnati. March 17. Joint meeting with the Engineer's Club of Cincinnati. Subject: The Manufacture of Armco Ingot Iron and Special Steel Sheets by T. W. Jenkins. This address was illustrated with motion pictures.

March 22. A meeting for the discussion of the bill before the Senate regarding the licensing of mechanical and electrical engineers.

April 21. Joint meeting with the Engineer's Club of Cincinnati. Subject: Rehabilitation of Men, by John T. Faig, President Ohio Mechanics Institute.

Cleveland. April 5. Subject: Thread-Milling Machines, by E. J. Lees, President, Lees-Bradner Co., Cleveland, Ohio.

Colorado. April 29. Meeting at the Metropole Hotel, Denver, Colo.

Columbus. March 11. At the Southern Hotel, Columbus, Ohio. Subject: Automobile Fuels, by Prof. C. A. Norman, of Ohio State University.

March 14. At the Chittenden Hotel, Columbus, Ohio, in honor of Ex-President Hollis.

April 8. At the Engineer's Club, Columbus, Ohio. Subject: Combustion and Boiler Operation, by E. G. Bailey, of the Bailey Meter Co., Cleveland, Ohio.

Connecticut State.

Bridgeport Branch. February 17. Subject: Measuring and Manufacturing to One-Millionth of an Inch, by W. H. Weingar.

March 24. Fuel as the Engineer Burns It, by F. F. Uehling, combustion engineer, Uehling Instrument Co., N.Y.C. The Purchasing Agent's Problem, by W. T. Birney, P. A. Winchester Repeating Arms Co., New Haven, Conn. The Operator's Viewpoint, by G. C. Squier, representing George E. Warren Co., miners. The Railroads and the Coal Pools, by Dr Henry M. Payne, Tidewater Coal Exchange, N.Y.C.

Hartford Branch. April 11. Subject: The Corrosion of Metal Surfaces. Joint meeting with the Connecticut Valley Section of the American Chemical Society.

Meriden Branch. April 15. Subject: Electric Furnaces, by H. A. Winne, of the General Electric Co., Schenectady, N. Y.

Eastern New York. (Schenectady, N. Y.) March 25. At Edison Club Hall. Subject: Design and Application of Hydraulic Machinery, by Lewis F. Moody, of the I. P. Morris Co. Motion pictures of the Development at Niagara Falls and lantern slides were shown.

April 29. At Edison Club Hall, Schenectady, N. Y.

Houston. March 25. Standardization of Drill-Pipe Threads, by F. L. Scott, of the Hughes Tool Co. Comparison of Efficiency of Various Types of Condensers, by A. E. Brewer.

Los Angeles. March 19. Field Day to inspect the Standard Oil Co. Plant at El Segundo. Dinner was held at one of the beach towns, and in the evening there was a talk on the El Segundo Plant. Motion pictures were shown describing the petroleum industry.

Metropolitan. (New York City.) April 1. Joint meeting of the Metropolitan Student Branches and Metropolitan Section and Division on Management. Caliper Yourself, by G. Kingdon Parsons, Consulting Engineer; Super-Power as an Answer to National Power Policy, by W. S. Murray, consulting engineer; The Opportunity of the Engineer in Management, by Dexter S. Kimball, Cornell University; Types of Industrial Organizations, by C. E. Knoeppel, industrial engineer; Unsolved Management Problems, by L. W. Wallace, Secretary, American Engineering Council, and President of the Society of Industrial Engineers.

April 22. Joint meeting with the A.I.E.E. Subject: Engineering Education, with Professor Comfort A. Adams in charge of the meeting.

Mid-Continent. (Tulsa, Okla.) April 28 and 29. Joint meeting of the Chemical and Engineering Societies.

Milwaukee. March 16. Subject: Coals of the U. S.: Their Composition and Physical Characteristics, by Henry Kreisinger, fuel engineer, in charge of fuel investigation, Bureau of Mines.

Minnesota. April 5. At the Engineering Auditorium, University of Minnesota. Subject: Modern Hydraulic Turbines of American Design, by Arnold Pfau.

Ontario. March 18. Joint meeting with the American Society for Steel Treating. Subject: The Hump Method for Heat Treatment of Steel, by G. W. Tall, Jr., of Leeds & Northrup Co. Philadelphia, Pa.

April 1. Subject: The Manufacture of Armco Ingot Iron and Special Steel Sheets, by T. W. Jenkins, American Rolling Mill Co., Middleton, Ohio.

Philadelphia. April 1. Students' Night. The speakers were Wm. D. Disston, Hugo Bilgram, C. N. Lauer, W. C. L. Eglin and J. G. Strachan.

April 26. Subject The Spirit of Management an Attitude of Mind, by Edward G. Budd.

Providence. April 12. The Textile Professional Section of the A.S.M.E. with the Providence Engineering Society and the Providence Section A.S.M.E. met at the Club Rooms of the Providence Engineering Society.

Rochester. April 11. Dinner and joint meeting with the Rochester Chamber of Commerce and other engineering societies of Rochester. Subject: The Development of Modern Industry, by Dean Dexter S. Kimball, of Cornell University.

St. Louis. April 1. Joint meeting with the Associated Engineering Societies of St. Louis. Subject: A Trip to Dayton, Ohio, and a Visit to the National Cash Register Factory, by E. D. Smith, of the National Cash Register Co., Dayton, Ohio. Moving pictures accompanied this address.

April 29. At the American Hotel. Subject: Powdered Fuel, by H. I. Gentine, of the American Atomized Fuel Co.

Coming Section Meetings

Great Lakes Regional Meeting June 13 and 14

Local sections and engineering clubs in the following cities have been invited to participate in this meeting: Akron, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Detroit, Erie, Rochester, Toledo, Indianapolis, Ontario, Pittsburgh, and the Engineering Society of Dayton. Headquarters Hotel Statler, Cleveland, in rooms of Cleveland Engineering Society.

Atlanta.

May 21. At the Gas & Electric Building, Atlanta, Ga. Joint meeting with the local section A.I.E.E. Subject: Hydroelectric Power Plants, by C. G. Adsit, of the Georgia Railway and Power Co.

Baltimore.

May 5. Joint meeting with the Engineers Club of Baltimore. Speaker to be Frank B. Gilbreth, of Montclair, N. J.

Birmingham.

May 18. At the Southern Club, Birmingham, Ala. Annual Business Meeting.

Connecticut State.

Hartford.

May 9. Get-Together Dinner at the City Club, Hartford, Conn. Subject: Corrosion of Metal Surfaces, by Dr. A. S. Cushman, Dir. of Inst. of Industrial Research, Washington, D. C.

Detroit.

May 6 or 20. Joint meeting with the Detroit Engineering Society, and the A.I.E.E. The speakers will be Messrs. Clark and Gadusha.

May 13 or 27. Joint meeting with the Detroit Chapter A.I.E.E.

Eastern New York.

May 19. At Edison Club, Schenectady, N. Y. Subject: Synchronous Motors, by A. R. Stevensen, of the General Electric Co.

Mid-Continent.

Weekly luncheons every Friday noon, at Tea Cup Inn, Tulsa, Okla.

Philadelphia.

May 20. At Hotel Adelphia Roof. Annual Section's Dinner. Vaudeville entertainment, several short talks and announcement of election of officers.

Rochester.

May 5. Joint dinner of the professional engineers of Rochester, at the Powers Hotel. The speaker is to be Calvert Townley.

San Francisco.

May 19. Subject: The Handling and Refining of Sugar, by George M. Rolph, of the California Hawaiian Sugar Co.

San Francisco. March 17. Joint meeting with the A.I.E.E. The Present Status of Steam Electric Generation in Oil-Fired Plants of the Pacific Coast, by Robert Sibley, Editor, *Journal of Electricity and Western Industry;* Efficient Operation of Oil-Fired Steam Electric Stations, by C. H. Delaney, Pacific Gas & Electric Co. Motion pictures, depicting the conditions which necessitate the maintenance of stand-by steam plants for hydroelectric service.

April 14. Subject: The Gas-Fired Steam Plant of the San Joaquin Light Power Co., by A. Y. Mendell of the San Joaquin Light Power Co.

Tri-Cities. April 14. At the Chamber of Commerce, Clinton, Iowa. Subject: Woodwork, by Sern Madsen, of the Curtis Co., Inc.

Washington, D. C. March 31. The Application of the Recuperator to Gun Carriages, Including Theory and Principles of Construction, by Major J. B. Rose, Ordnance Dept., U. S. A.; Design and Construction of the 16-in. Disappearing Gun Carriage from an Engineer's Standpoint, by Major G. M. Barnes, Ordnance Dept., U. S. A.; The Work of the Local Sections Committee, by Charles Penrose, of Philadelphia, Pa.

Worcester. March 11. At Crompton & Knowles Loom Works, Weave Shop.

March 23. At Harvard Union, Cambridge, Mass. See Boston meeting, March 23.

March 24. Luncheon at the Bancroft Hotel, Worcester, in honor of President E. S. Carman.

Personals

The Engineering Business Exchange conducted by CHARLES WHITING BAKER announces the opening of a Southeastern Branch with offices in Washington, D. C., which will be under the direction of MARSHALL O. LEIGHTON, who during the past three years has rendered valuable service to the engineering profession as the chairman of the National Service Committee of Engineering Council. Associated with Mr. Leighton in carrying on the Exchange will be A. C. OLIPHANT, who has also been active in the work of the National Service Committee. The Southeastern Branch will cooperate with the main office of the Exchange in New York City but will have especial charge of the territory from Maryland to Alabama, inclusive. The former work of Messrs. Leighton and Oliphant in the Washington office of Engineering Council will be transferred to L. W. Wallace, secretary of the Federated American Engineering Societies, now occupying headquarters in Washington.

JOHN T. SHARP, Jr., superintendent of the Canton Electric Light and Water Works, has been made manager of the newly organized Winona Public Utility Plant. This plant is a reorganization of the Winona Light, Ice, Water and Sewerage Company which the City of Winona has purchased and remodeled so as to provide water and light services for the entire city.

GARDNER C. DERBY, formerly district manager of the power apparatus department of the New York office of the B. F. Sturtevant Company, is now located at the factory home office at Hyde Park, Boston, taking charge of the fuel economizer and mechanical draft department.

The name of the Durant Building Corporation, Detroit, Mich., of which C. C. WILCOX is chief engineer, has been changed to the General Motors Building Corporation.

CHARLES EISLER, consulting engineer of Newark, N. J., has purchased the assets of the National Machine & Tool Co. of Newark, N. J. and reorganized it under the firm name of Charles Eisler Engineering Company, which will manufacture gear testing machines and incandescent lamp machinery.

CLARENCE M. DAVISON, until recently manager of the service station, Alsop Motor Corporation, Richmond, Va., is now general superintendent of the Poole Engineering & Machine Company, Baltimore, Md.

DR. WILLIAM N. BEST, retiring president of W. N. Best, Inc., which has been sold to the W. N. Best Furnace & Burner Corporation, recently incorporated under the laws of New York, will act as consulting engineer for the new company, in which he has a large financial interest.

ALPHONSO TAUBMAN has severed his connection with the Virginia Railway & Power Co. and is now with the Birmingham Railway, Light & Power Co., Birmingham, Ala., as superintendent of equipment.

Announcement is made that the firm of Arison, Goodwin & Knapp, industrial engineers, Chicago, Ill., is dissolved on the retirement of L. G. KNAPP. The business will be carried on with COL. EDGAR E. ARISON and L. Reeves Goodwin as the senior members under the firm name of Arison, Goodwin & Associates.

ALBERT J. ROMER, formerly mechanical engineer for the New Departure Manufacturing Company, Bristol, Conn., and more recently chief engineer and designer for the Northway passenger car of the Northway Motors Corporation, Natick and Boston, Mass., has formed the Romer Motors Corporation, Boston, Mass. A factory for the manufacture of passenger cars will be erected at Danvers, Mass.

G. S. MARTINDALE has severed his connections as resident engineer for The General Motors Corporation, St. Louis, Missouri, to become works engineer for The Champion Coated Paper Company, Hamilton, Ohio.

W. K. KIRBY, chief engineer of construction for James Stewart & Co., has recently returned from Paris and is now located in New York City.

E. T. SPIDY has resigned his position as production engineer, C. P. Ry. Angus Shops, to take a position as assistant superintendent of The Dominion Engineering Works, Montreal, Canada.

C. H. PETERSON, formerly with the Iron Mountain Company, Chicago, Ill., is now vice-president and general manager of The Viking Corporation, manufacturers of automatic fire protection apparatus, Hastings, Mich.

ALBERT H. ISRAEL, formerly works manager of the American Mustard Company, Inc., Brooklyn, is now general manager of the Mustard Products, Inc., Brooklyn, N. Y.

LOUIS T. KLAUDER has resigned his position as construction engineer for the Philadelphia Rapid Transit Company and will enter the consulting engineering field, specializing in plant design and construction.

OTTOMAR H. HENSCHEL has resigned his position as associate editor and consulting engineer on the staff of *Power Plant Engineering*, Chicago, Ill., to become associated with Deane S. Holt of Milwaukee in The Holt Power Equipment Company.

Among the appointments to the College of Engineering of the University of Illinois for the year 1920–1921 are the following A.S.M.E. members: JOSEPH A. POLSON, associate professor of steam engineering; CLARENCE W. HAM, associate professor of machine design; ARTHUR H. AAGAARD and H. O. GROFT, instructors in mechanical engineering; HAROLD N. PARKINSON, instructor in railway mechanical engineering; and JEAN P. LEINROTH, instructor in theoretical and applied mechanics.

C. LEE STRAUB, formerly with the Catton Neill Company, Honolulu, is now with Stephens & Company, San Francisco, Cal.

FREDERICK E. BANKWITZ, who was formerly with Fletcher-Thompson, Inc., Bridgeport, Conn., is now with the Habirshaw Electric Cable Company, Yonkers, N. Y.

W. D. MANN is now connected with the Pneumercator Company, New York, N. Y. He was formerly combustion engineer in the engineering department of the Petroleum Heat and Power Company, Boston, Mass.

N. K. ALTHOUSE, formerly assistant engineer of the Braden Copper Company, has become associated with the Homestead Valve Manufacturing Company, New York, as sales engineer.

Necrology[1]

ELMER A. BEAMAN, until recently treasurer and general manager of the Beaman & Smith Co., machinists, Providence, R. I., died on January 4, 1921. Mr. Beaman was born in Worcester, Mass., on September 2, 1846. He was a Civil War veteran, having fought with the 23d Regiment, N. Y. State National Guard, in the battle of Gettysburg, and later was with the 42d Regiment, Massachusetts Volunteer Militia. He was a member of the Providence Chamber of Commerce, the National Metal Trades Association, the Prescott Post of the G. A. R., and was a 32d degree Mason. He became a member of our Society in 1891.

CHARLES W. CADE, factory manager of the McKinney Manufacturing Co., Pittsburgh, Pa., died on January 22, 1921. Mr. Cade was born in Cambridge, Mass., on August 1, 1879. He was a graduate of the Massachusetts Institute of Technology, class of 1901. Mr. Cade became a member of the Society in 1914. He also belonged to the Western Society of Engineers.

WILLIAM DUNDERDALE FORBES, formerly president of the W. D. Forbes Co., engineers, New London, Conn., died on February 17, 1921. Mr. Forbes was born in Perth Amboy, N. J., on July 10, 1852. He received his early education in the public schools of Buffalo and later received his M.E. degree from the Polytechnic Institute of Zurich, Switzerland. He also took post-graduate work at the Polytechnic in Dresden, Germany. Mr. Forbes was a member of the council of the Society of Naval Architects and Marine Engineers, an associate member of the American Society of Naval Engineers and a life member of our Society, since 1886.

FREDERICK W. HOLLMANN, master mechanic, Bethlehem Steel Co., Sparrows Point, Md., died in January 1921. Mr. Hollmann was born in New York City in July 1883. He was educated in the public schools of the city and Columbia University, from which he received his M.E. degree in 1905. He became a junior member of the Society in 1907 and attained full membership in 1914.

EDGAR RAYMOND PIPER, head of the department of drawing and design, Wentworth Institute, Boston, Mass., died on December 20, 1920. Mr. Piper was born in Boston, Mass., on August 4, 1872. He was a graduate of George Washington University. He became a member of the Society in 1920. He was also a member of the Washington Society of Engineers.

CECIL P. POOLE, city mechanical engineer of Atlanta, Ga., died on February 23, 1921. Mr. Poole was born in Elizabeth City, N. C., in October 1865. He was educated at Johns Hopkins and Cornell University. He was a Fellow of the American Institute of Electrical Engineers and a member of the Society of Automotive Engineers and also of the American Society for Testing Materials. He became a member of our Society in 1909.

WILLIAM H. VAN DERVOORT, prominent war-munitions manufacturer and president of Root & Van Dervoort Engineering Co., East Moline, Ill., died on February 25, 1921. Mr. Van Dervoort was born on February 28, 1869, in Ypsilanti, Mich. He was a graduate of Michigan Agricultural College and a post-graduate of Cornell University. He was a member of the Munitions Standards Board during the war and later was appointed by President Wilson to the War Labor Board. At the close of the war he was one of a commission of five chosen by the National Industrial Conference Board to go to study industrial conditions in Europe. He became a member of the Society in 1914.

[1] For details of the professional careers of deceased members, see necrology section of the forthcoming issue of the Transactions of the Society.

EMPLOYMENT SERVICE BULLETIN

Conducted by the Employment Service of The Federated American Engineering Societies,
29 West 39th Street, New York

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers: non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

MECHANICAL ENGINEER to develop and improve labor-saving machinery. Location New York City. X-40.

EXCELLENT OPPORTUNITY offered in Shanghai, China, for thoroughly experienced designing erecting power-plant engineer to handle well-known equipment for established export organization able to finance any installation. Willing to give responsible capable engineer good salary and opportunity to secure up to twenty-thousand dollar interest partnership in firm. Only high-grade financially able man considered. Give detailed experience references first letter. All confidential. X-142.

AMBITIOUS YOUNG MEN, ten, for salesman's training course with company manufacturing pumps. Must have vision enough to take full advantage of an extensive shop and office training and must be capable of development into high-grade representatives. Engineering degrees required. Application by letter. X-165.

DESIGNING ENGINEER on automatic and labor-saving machinery. Man with inventive turn of mind and resourceful. Location Rochester, N. Y. X-166.

ENGINEER familiar with designing, testing and production of machine tools such as milling cutters, drills, reamers, counterbores, spot facers, etc. Location Indiana. X-265.

ENGINEER experienced in microscopy, photography, physics, and chemistry for research work in laboratory of large rubber company. Location New York City. X-269.

MECHANICAL ENGINEER familiar with power-plant equipment and operation as assistant general sales manager with established manufacturer of power-plant specialties, condensers, etc. Sales experience and ability to grasp details an asset. State where graduated, course, experience, age and salary expected. Good opportunity for right man. Location Pa. X-292.

POWER-PLANT ENGINEER for executive and sales work with company manfuacturing water purification apparatus. Should have at least 2 years' experience. State age, education and experience. Location New York City. X-296.

STRUCTURAL STEEL DRAFTSMAN experienced in mill, bridge and public buildings of all kinds. Location New Jersey. X-301.

FACTORY SUPERINTENDENT for concern manufacturing food products. Location New Jersey. X-302.

MECHANICAL ENGINEER assigning work in boiler shop. Familiar with boiler construction and shop for refinery. Age 30. Location New Jersey. X-305.

ENGINEER with rubber experience and especially rubber compounds; to be permanently located in China. Must be good executive. X-309.

ELECTRICAL or MECHANICAL ENGINEER, technical graduate with 2 or 3 years' practical experience in power-station, substation, transmission and distribution work. The work to consist largely in analyzing construction and operation costs, preparation of contracts and estimates for future work and preparation of special reports. Give detail of experience, references and salary expected in first letter. Location New York City. X-316.

UPERINTENDENT for shops, wanted by Philadelphia plant building machinery, employing about 100 men. Must be graduate mechanical engineer, protestant, 30 to 40 years old, of proven ability and with practical experience covering shop management, production, planning, improved labor-saving and manufacturing methods, and capable of increasing product and decreasing costs. Give full particulars as to education and experience. State salary desired and furnish references. X-321.

SUPERINTENDENT of foundry laboratory in large University in Middle West. Age about 28 or 30. College training desirable but not required. Applicant must understand modern methods of foundry management, production and operation. Excellent opportunity for ambitious and competent man who wishes to engage in teaching and research work. Position open September 1, 1921. Location Illinois. X-329.

ASSISTANT SUPERINTENDENT in forge laboratory in large University in Middle West. Applicant must be familiar with modern methods of heat treatment of steel and with forge-shop management. Age not over 28 or 30. College training desirable but not required. Position open September 1, 1921. Good opportunity for young man wishing to enter profession of teaching. Location Ill. X-330.

GENERAL FOREMAN, high class, clean cut, competent for old, established factory manufacturing parts comparable to high-class automobile work. Give full experience references, general description of self, small recent photo and starting salary. Location Michigan. X-331.

ENGINEER with paper-making machinery experience. Must have been machine-shop foreman, and good executive; also experienced in repairing machinery. Location Brooklyn, N. Y. X-333.

CHIEF DRAFTSMAN under age of 45. Experienced in electrical, civil and mechanical design for power plants, steel structures and railways, to take charge of draftsmen in engineering office. Must be diplomatic and able to supervise force and get results. Location Middle West. X-340.

SALES ENGINEERS with demonstrated selling ability, to sell elevator guide-rail lubricator. Experience in building supply or power-plant specialty lines desirable. Long residence in city where they intend to work would be helpful. Men 25–35 would be most suitable. Territory open. Chicago, Phialdelphia, Detroit and Cleveland. X-348.

ASPHALT-ROOFING SALESMAN FOR FOREIGN SERVICE. Men with broad practical experience both in selling and application work. X-352.

YOUNG MAN, American, age 25 to 30 years; single preferred. Must travel. Prefer graduate engineering college. Must have shop and drafting-room experience on machine tools, jigs, fixtures, special machinery; experimental experience preferred. This is salesman engineer's job. Must be able to talk and write; possess good health, be neat in appearance, and have pleasing personality. Would be placed in engineering sales dept. for 3 months' training and then would be required to devote about one-half time on road, and other half would be spent in office working out ideas of application. X-353.

SUPERINTENDENT to have charge of factory and foundry. Must be man of experience. Board of Directors (in order to secure men who will devote whole-hearted interest to business) have decided that superintendent must make investment of $5,000. Investment to consist of loan to company with agreement that stock may be taken if so desired within one year. Company has been in active business for over 30 years and has more than ample assets to protect loan. Compensation liberal and advancement based on achievement. Location Conn. X-355.

DRAFTSMAN familiar with design and construction of brass, iron and steel valves for steam and water. Location, East. X-361.

ENGINEER familiar with and experienced in designing Diesel or heavy-oil engines. Capable of doing layout work on drafting board in working out designs. Time will largely be spent in drafting room on such work. Location New York City. X-362.

OPERATING ENGINEER, experienced, practical; splendid opportunity for advancement. Must be experienced in operation of oil engines, preferably of the De LaVergne type. Should also have practical electrical power-house and refrigeration experience. Should be aggressive, responsible type of absolutely sober habits, whose personal integrity and mechanical training and experience can be verified, beyond question, from independent sources. Location Colombia, South America. X-372.

MEN AVAILABLE

The large number of requests to insert notices under this heading makes it necessary hereafter to limit the number of words in each notice to 20 so that as many members as possible may be accommodated.

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter; unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

FACTORY ENGINEER or tool supervisor, 12 years' development of tools, special machinery and routing of product and department improvements, for quality production on quality basis. At present managing engineering company. Location preferred, South or West. SM-6198.

MECHANICAL ENGINEER, technical graduate, age 31; single. Desires permanent location with industry offering advancement; 5 years with railroad motive-power department. Experienced in experimental work, shop practice, inspection, production, design, etc. Two years resident inspector, Engineering Corps. Business training and sales ability. Location immaterial. SM-6199.

INDUSTRIAL ENGINEERING EXECUTIVE, age 36; married; 15 years' development, manufacturing and research experience; practical mechanic and engineer, tool and drafting room experience, proven ability in processing and manufacturing. Small cast and sheet-metal specialties on quantity basis; 5 years in present position, best of references. Salary $4,000. Location Philadelphia, New York or vicinity. SM-6200.

INDUSTRIAL-PLANT ENGINEER, age 34; married; American; specializing in layout of mechanical equipment and reorganizing for economic and efficiency standards. Especially familiar with brass and copper rolling-mill work; references. SM-6201.

MECHANICAL ENGINEER, technical graduate; age 36; 12 years' experience layout, installation, maintenance, mining machinery and power plants. Three years' design, layout, stock and product inspection, experimental work in manufacturing plant. Desires position as executive or assistant to executive. SM-6202.

MECHANICAL ENGINEER, age 36; 15 years' practical experience on design and construction of special and automatic machinery, tools and fixtures design, routing and planning production, systematizing; competent to take charge and get results; ability to develop inventions. Desires change; location immaterial. Pacific Coast considered. SM-6203.

MECHANICAL ENGINEERING specialist in development of automatic and labor-saving machinery to reduce cost of manufacturing processes. Graduate Mass. Inst. of Tech. Five years' experience. Capable of directing experimental work. SM-6204.

MECHANICAL ENGINEER, graduate M. I. T.; specialized in steam and combustion engineering, experienced in design, construction and efficient operation of stationary power plants; desires responsible position with firm of consulting engineers, or as steam or combustion engineer of well-established concern. Minimum salary $200. SM-6205.

ASSISTANT TO WORKS MANAGER or similar executive. Mechanical engineering graduate, age 30; married; one year executive experience; 2 years' of machine design, plant layout and production work; one and half years' machine shop. Desire

place of larger responsibility and opportunity. Employed; references; salary $3,000. SM-6206.

MECHANICAL ENGINEER, college graduate; American; age 39; married. Field and office experience, drafting, supt. of construction, power-plant efficiency, testing, inspection. Marine engineer's ocean license. Mass. stationary license. Business course Alexander Hamilton Institute. New York or vicinity preferred. SM-6207.

TOOL DESIGNER, age 25, six years' broad and diversified experience in tool and jig design, wishes to make change. Location immaterial. SM-6208.

ENGINEER, age 32, wide experience in mechanical and civil lines for past 12 years, now employed as construction engineer, desires to get into engineer sales game. Mechanical education. From private to 2nd Lieut. A. E. F. Engineers. Moderate ideas on salary. SM-6209.

WORKS MANAGER, graduate mechanical engineer, successful record as factory executive with thorough training in drafting room, tool room, pattern shop, drop-forge shop and foundry practices. Age 30; married. Familiar with most modern industrial methods. SM-6210.

MECHANICAL ENGINEERING graduate; age 24; with experience in operation of small power plants, wishes to connect with firm engaged in design of power plants. Location immaterial. SM-6211.

SUPERINTENDENT or production engineer; 20 years' practical experience in building and designing machines and special tools; 8 years' connection with automobile manufacturer. Have held positions where intensive and accurate production was essential. At present employed, but desire change. Location immaterial. SM-6212.

RESEARCH ENGINEER, capable of scientific investigation or development of unperfected devices. Inventive and of wide designing experience; competent on any mechanical problem. Specialty, internal-combustion engines; technical author, teaching experience. Age 36; married. SM-6213.

ENGINEER with 2 years' practical civil engineering; 4 years' mechanical and electrical University course; 14 years' general engineering experience including design and construction work, also installation of oil-refining machinery; industrial plant machinery, boiler house and power plant machinery, and large steel-plant machine tools with electrical equipment; steam, air and water piping incident thereto. Thoroughly practical, executive ability. No objection to foreign service, providing salary is commensurate with position and location. Minimum, U. S. $5,000. At present employed. SM-6214.

MECHANICAL ENGINEER, capable executive, ex-A. E. F. officer; experienced in management, production, processes and design, equipped with mechanical and business education and 19 years' shop and office experience, desires permanent connection. SM-6215.

MECHANICAL ENGINEERING graduate, 6 years' experience in production and inspection work on medium-sized machined pieces and sheet steel products. Have successfully organized inspection department and held position of chief inspector. Actively participated in development of production of intricate machines and apparatus. Now teaching and studying at one of leading technical universities in East; free for work during summer. SM-6216.

SUCCESSFUL EXECUTIVE, graduate mechanical engineer with experience installing production and cost systems, labor-saving devices and conveying machinery. Has held positions as production manager and superintendent of machine shops and foundries; shown results in every case. SM-6217.

MANAGER, general superintendent, mechanical engineer; 18 years' broad practical experience in mechanical lines and foundry practice; 10 years' in executive capacities operating plants employing from 100 to 1000. Forceful and diplomatic executive, and can secure cooperation between various departments and harmony between company and employees. Initial salary $5,000. SM-6218.

MECHANICAL ENGINEER, graduate, desires responsible position, development, construction or maintenance. Age 33; married; 11 years' engineering experience covering machine design, cottonseed-oil mills, power houses, nitric and sulphuric-acid plants, coal-tar products, dyes, nitro-cellulose ether, alcohol and artificial silk. Board initiative and executive ability. Capable of intelligent leadership and helpful cooperation. SM-6219.

YOUR ENTERPRISE DEMANDS ENERGY, INITIATIVE AND ABILITY, and I have these together with fact that I am graduate of leading technical school, and have had thorough experience in machinery installation and handling of large organization; well known in South, and desire to connect with enterprising manufacturing company which requires executive or assistant to executive; am sure of my ground and can only consider excellent proposition. Now holding responsible position. SM-6220.

MANUFACTURING EXECUTIVE, graduate mechanical engineer (Cornell 1912) with broad experience in factory management, handling of men and organizing and controlling production. Age 31; married. SM-6221.

REPRESENTATIVE, sales engineer, age 27; mechanical engineer; 7 years' designing and selling experience in heating, ventilation, sewage, sanitation, refrigeration, piping, power plant, etc. Desires change with progressive firm of engineering equipment or materials. SM-6222.

MECHANICAL ENGINEER, age 36; technical graduate; 12 years' experience as engineer in design and construction of industrial and power plants and as sales engineer for mechanical and power equipment; desires permanent position as sales engineer for machinery or as mechanical engineer with consulting or construction engineers. SM-6223.

INDUSTRIAL ENGINEER and draftsman recently with $30,000,000 corporation; 12 years' manufacturing experience, machine shop, rubber-tire industry and other mills. Shop experience and technical training, specializing in practical working conditions, desires opportunity to work out cooperative, labor-saving and economic layout of equipment. Age 35; married. SM-6224.

INSTRUCTOR mechanical engineer, with successful teaching and practical experience, open for teaching engagement next fall. Only position of responsibility considered. Satisfactory living conditions for family most essential consideration. SM-6225.

MECHANICAL ENGINEER, age 33; single; American; University education; 12 years' varied experience on design of tools, jigs, fixtures and special machinery; foreign trade and export business, power-house ventilation, shop experience, design of 7200-gal. alcohol distillery in connection with 2400-ton sugar plant. Location domestic or abroad; available immediately. SM-6226.

INDUSTRIAL ENGINEER, graduate Cornell 1917; age 26; two years' overseas Lieut. F. A. Year and half experience with Gantt methods and large manufacturing. Desires responsible position with firm of industrial engineer or large manufacturing concern located in East. Future and opportunity for advancement main consideration. SM-6227.

MANUFACTURING EXECUTIVE and MECHANICAL ENGINEER, age 38; 12 years' executive experience in design and manufacturing of high-grade machinery, typewriters, typesetting machines, printing presses, photo-engraving equipment for litho work, precision machinery, stamping and bottling equipment for food preserving, technical instruments and automobiles. A-1 practical man with ability to control help and thoroughly experienced in modern production methods. SM-6228.

MECHANICAL ENGINEER, graduate; age 30; married. Extensive experience as assistant chief mechanical engineer in complete charge of design and layouts of oil refineries. Specializing in design of steam plants, pumping systems and oil-burning equipment; also thorough knowledge of methods of testing mechanical equipment. SM-6229.

MECHANICAL ENGINEER, graduate Sheffield Scientific School, age 25. Holder of Second Assistant Marine Engineer's License. One year's sales-engineering experience in steam specialty, pipe, valves and fittings in power plants and industrial processes. One year as work's manager of company manufacturing trailers. Desires connection with concern in vicinity of Chicago in sales work, assistant to vice-president of manufacturer, or similar position wherein above experience and education will be of use. Willing to work for small salary in Chicago, if position offers opportunity upon recognition of ability. SM-6230.

PLANT ENGINEER or master mechanic; American; age 32. Ten years' broad experience in design, installation, maintenance and successful handling of labor. SM-6231.

EXECUTIVE with 12 years' broad engineering experience and sound business training, desires executive position to which engineering knowledge is essential and which has future sufficiently attractive to warrant change. Also Assoc. A. I. E. E. Age 34; married. Location immaterial. Present salary $6,000. Available on 30 days' notice. SM-6232.

FACTORY REPRESENTATION, now handling accounts of four firms in eastern and export trade, desires to secure two or three additional firms that need this service. Has had ten years' engineering, construction and sales experience. Office located in financial section of N. Y. C. SM-6233.

MECHANICAL ENGINEER, Columbia graduate 1913. Now studying accountancy at N. Y. U. evenings. Engineering Ensign during war; 6 years' draftsman, machinist, salesman and test-man of power-house auxiliaries and printing machinery. Prefer New York City. SM-6234.

MECHANICAL ENGINEER, technically trained at Worcester Polytechnic Institute. Age 25. Experience involves general machine-shop work, toolmaking, foundry (iron) work as moulder and as assistant foreman, machined parts inspection, draftsman and as junior engineer in experimental laboratory. Desires work preferably in experimental or development lines where inventive ability in connection with sincere appreciation of practical problems is needed. SM-6235.

TOOL DESIGNER, age 24; married; 7 years' real practice desires to connect with live progressive firm, where thorough knowledge of shop-practice planning and tool designing will be recognized and appreciated. Location New York City or Connecticut preferred. SM-6236.

ENGINEER, age 31; with 12 years' varied mechanical and chemical engineering experience, desires information of position involving work of investigative character, preferably in connection with manufacturing process control. Present salary $3,300. SM-6237.

TECHNICAL GRADUATE, age 27; single; 8 years' power-plant design, estimating and construction experience. Desires to make connection with some live organization either in capacity of correspondent, estimator or erecting engineer. Minimum salary $200 per month. SM-6238.

DRAFTSMAN, age 31; M.E. degree, single; 8 years' experience covering marine and station power-plant arrangement, piping and accessories. SM-6239.

MECHANICAL ENGINEER, average earnings past 20 years, $7,500 per annum. Qualified business administrator. Thoroughly familiar with lumber, and heavy lines iron, steel and machinery. Wide experience as designer, inventor, and foreign salesman. Married. Prefer New York or Philadelphia. Good investigator and report writer. Let me develop an export business for you. SM-6240.

EXECUTIVE, can get good work done efficiently, knows what good work is, and when it is efficiently done; 5 years' engineering training and experience, coupled with all-round knowledge of every department of business. Successfully held positions of superintendent, chief engineer and works manager. SM-6241.

MECHANICAL AND SALES ENGINEER, graduate mechanical engineer, age 30; ex-army officer, successful sales experience large power-plant machinery, wishes to locate permanently in St. Louis, Missouri. Desires position as sales manager or exclusive agency line of real merit. $3,600 salary or can invest small amount of capital in growing concern. SM-6242.

EXECUTIVE for SALES or FACTORY MANAGEMENT, experienced in design, manufacture and sales of power-plant apparatus; also experienced in quantity production of small parts. Technical graduate; at present employed. SM-6243.

OIL-REFINING ENGINEER acting as assistant to general manager of 20,000-bbl. refinery with experience in design, construction and operation of all equipment used; graduate electrical engineer; age 31; married. Desires similar position with organization affording opportunity for advancement through reason of having desirable personal qualities and ability to handle large affairs. SM-6244.

ELECTRICAL and MECHANICAL ENGINEER, technical graduate 1907. Desires connection with company manufacturing specialty. SM-6245.

MECHANICAL ENGINEER, technical graduate, age 26; 3 years' practical and 3 years' executive experience. Exceptionally good training in inspection work. Desires position with concern where future is unlimited. Personality, initiative and adaptability are prominent points in character. Location immaterial. SM-6246.

SALES ENGINEER, age 30; married; 10 years' successful experience in designing, estimating, superintending erection and sales engineering on power plant, heating and ventilation and refrigeration work, desires to connect with reliable, progressive organization representing any or all of the above lines. Headquarters preferably Philadelphia. SM-6247.

INDUSTRIAL RELATIONS EXECUTIVE of many years' experience in employment management, industrial-educational work as director with one of the largest manufacturing plants in country. Work covered supplemental training of technical graduates and trades apprenticeship courses. Have supervised welfare activities, safety engineering, suggestion systems and employees committees. Familiar, through actual experience with modern machine-shop practices, steel mills, fire arms, steel-shop construction, and manufacture of electrical machinery. Technical graduate in mechanical and electrical engineering. Satisfactory references. SM-6248.

EXECUTIVE ENGINEER, high-grade industrial-plant engineer wants position as engineering manager or works engineer. Good executive, capable of taking complete charge of work and getting results, 18 years' experience designing and erecting, contract- and purchasing, managing and operating complete

steam-power plants and industrial plants. American; married, age 43; good personality. A-1 references. SM-6249.

MECHANICAL ENGINEER, experienced in design and maintenance of industrial plants and equipment desires position as assistant chief draftsman or engineer. SM-6250.

SALES ENGINEER and TECHNICAL CORRESPONDENT, graduate mechanical engineer, age 30, desires connection with firm handling air compressors, pumps, and allied products; 6 years' general engineering experience, including testing and standardization, one and one-half years' industrial engineering and plant design, and one and one-half years' plant operation and maintenance. Location Philadelphia or vicinity. SM-6251.

MECHANICAL and ELECTRICAL ENGINEER, age 27; married; technical graduate; 2 years' experience as technical assistant to superintendent of oil refinery; 4 years' in engineering department of large research institution, 3 being in capacity of mechanical superintendent. Capable as plant executive. Location Philadelphia, St. Louis or South. Salary $3,600. SM-6252.

MECHANICAL and SALES ENGINEER, M.E., age 28; married; 7 years' experience in designing, charge of engineering department, field installation; construction engineer; sales engineer and purchasing engineer. Particularly qualified to assist busy engineering executive or take charge of commercial or business department of engineering concern. Location desired, New York City or vicinity. SM-6253.

ADVERTISING, young mechanical engineer wishes to connect with advertising or publicity department of engineering concern. Recent graduate Stevens; highest references. At present employed. SM-6254.

MECHANICAL ENGINEER wants job where ability to stop leaks will be valuable. Systematize but not by red tape. Ten years' experience; at present in charge of design and production of contracting shop. Salary $6,000, but want chance to earn more. Location unimportant. New York City preferred. SM-6255.

MECHANICAL ENGINEER, technical graduate; age 25; single, 3 years' experience with large sugar company on control work, concrete foundation and steel-building erection. Desires opportunity to locate with concern which wants young engineers to train for executive positions or for industrial-engineering work. SM-6256.

SHOP SUPERINTENDENT or general foreman. Not technical graduate; 26 years' on precision tools, interchangeable parts and automobiles; 13 years as executive working up from apprentice to general superintendent. Wages secondary consideration. Location New England States preferred, but Middle West considered. SM-6257.

DESIGNING ENGINEER with 7 years' experience in general engineering and 8 years' in design of small and medium-sized direct and alternating-current apparatus. Developed motors and generators for practically all industrial applications. Can furnish reference showing high-grade of mathematical and analytical ability. SM-6258.

MECHANICAL ENGINEER, graduate; thoroughly grounded; age 27. Subordinate and executive experience in foundry, machine shop, design, plant layout, production engineering, correspondence and sales. Desires connection with progressive concern. Open-minded, willing to work. Have sold anti-friction bearings and shop equipment. Send for detailed experience chart. SM-6259.

COMPTROLLER, financial man, at present comptroller in large industrial organization; has successfully devised and installed production and cost-accounting methods; desires connection with manufacturing or professional organization; 15 years' experience, partly professional, in widely varied industries, including metal and wood working, leather, enameling, paints, power plants, etc. University graduate; age 36; married. Beginning salary, $7,000 annually. SM-6260.

PRODUCTION ENGINEER, age 26; B.S. degree and post-graduate study in factory management. Experienced in time-study, plant layout, cost estimating, and production-control installation. Desires position either as assistant to manufacturing executive, or junior on staff of industrial engineer. Will also consider industrial engineering-research work. N. Y. City or metropolitan district preferred. SM-6261.

MECHANICAL and ELECTRICAL ENGINEER (Columbia) with broad and thorough engineering training and ability to get results. Desires position where results count. Experience includes work on general construction and in all departments of large electrical utility company. SM-6262.

MECHANICAL ENGINEER, technical graduate; age 27; wishes to use spare time for drafting, designing or tutoring on technical subjects anywhere in New York City. Have initiative ability to develop inventions, and to see things through. SM-6263.

ASSISTANT PRODUCTION ENGINEER, mechanical engineering education. Familiar with all modern production and cost systems; 9 years' experience at production and mechanical engineering, planning, designing, estimating. Capable assuming responsibilities and handling men. Successful experience as head of planning department, assistant factory manager and chief tool designer. SM-6464.

MECHANICAL ENGINEER AND EXECUTIVE, American, age 38; married; Cornell; 17 years' experience as construction engineer, engineer in charge of design and estimates; supervising engineer, sales engineer and manager of branch. Qualified by experience and personality to deal with executives. Available May 1. SM-6265.

ENGINEER EXECUTIVE, age 38; has been very successful as chief engineer and consulting engineer, designing as well as supervising. Diversified experience in constructioa work; wishes to connect as assistant to president or general manager; preferably with manufacturing concern. SM-6266.

DRAFTSMAN, age 30; designer tools, jigs, dies, and fixtures, including automatic machinery. Practical die, precision and production experience. Fast, neat and conscientious worker. Technically educated. SM-6267.

MECHANICAL ENGINEER. Capt. Ordnance Dept., recently discharged, available on drafting board or in field. Many years experience in design and construction of power plants, chemical works, textile mills and industrial buildings. SM-6268.

SALES ENGINEER. Graduate textile engineer; age 29; married. At present employed. 4 years' experience in engineering; 2 years' captain Coast Artillery. Desires position selling high-grade product in New England. SM-6269.

ELECTRICAL AND MECHANICAL ENGINEER, age 39. Thirteen years' experience in teaching, designing, installation and operation, will be open for engagement as superintendent or manager of power plant, ice plant, mill or similar works. Available May 15. Minimum salary $6,000. SM-6270.

DESIGNER, engineer and chief draftsman, age 31; 13 years' experience on supervision and design of engineering work as machinery design, research, development and experimental engineering, plant layout, design and development, structural and all work kindred to general and industrial engineering. Good executive, organizer with initiative. Desires position in any branch of engineering. Best references. SM-6271.

MECHANICAL AND CIVIL ENGINEER, single; age 31; technical graduate; 12 years' practical experience design and field. Reinforced concrete, structural steel, all kinds machinery and piping; boiler houses; last 18 months oil refinery. Home or foreign service. SM-6272.

WORKS MANAGER, high-grade executive desires to sell his services; 15 years' experience as general superintendent and work manager on products such as electrical goods, brass novelties, automobile parts, ball bearings, valves and fittings. Thoroughly familiar with modern factory methods and at present successfully engaged as works manager. Desires to connect with manufacturer. SM-6273.

ELECTRICAL MECHANICAL ENGINEER, graduate Cornell and Pennsylvania State; 7 years' experience design, construction, operation, management, large power developments, high tension, distribution hydraulics, thermodynamics, contracts, specifications, reports, valuation costs, efficiency work. Desires connection with future where executive and engineering ability are requisites. Best references; salary $4,800. SM-6274.

MECHANICAL ENGINEER, technical graduate 1916; 14 months' sales engineering or power-plant auxiliaries, air compressors, etc. During war, inspector of machinery for Navy Department. Now production engineer for firm building marine machinery. SM-6275.

WORKS MANAGER or SUPERINTENDENT with 19 years' practical experience in varied industries as bench hand, foreman, superintendent, industrial engineer, production engineer and works manager. Especially fitted by training and experience to organize new industry or to reorganize and build up your present business. Not interested unless proposition refers to permanent connection; to one of this nature will submit complete details of qualification and A-1 references. Age 40; American; married. Available June 1. SM-6276.

INDUSTRIAL ENGINEER, college graduate; experienced as apprentice, machinist, foreman and superintendent. Have successfully installed time-study, routing, and planning for small parts quantity production; and shop cost accounting in heavy repair shop. Age 34; married. Available about June 1. SM-6277.

SALES ENGINEER, married; age 31. Experienced machine tool and equipment, oxy-acetylene apparatus, and machine operation; unlimited acquaintance in New England States. Salary $3,000 with expenses. SM-6278.

SALES ENGINEER or ASSISTANT SALES MANAGER. Experienced in sale testing and efficient application of lubricating oils in industrial plants. Interested in any other line of sales engineering which insures future advancement. Technical graduate. In reply please state just what is offered. SM-6279.

ENGINEERING EXECUTIVE, age 42; possessing tact, personality, and thorough experience in general plant design, financing reports, appraisal, especially successful in rehabilitation and modernizing of existing plants and foundries. SM-6280.

MECHANICAL ENGINEER, Stevens, 16 years' experience; experience in design and erection of factory buildings, design and installation of machinery and equipment, manufacture of water gas, soap, chemicals, and colliery maintenance. Age 39, salary $3,000. SM-6281.

SALES ENGINEER desires position with machine tool concern in sales department. Well acquainted with New England territory; for past two years has been selling direct for well-known New England machine tool manufacturer. Married. SM-6282.

MECHANICAL DESIGNER, graduate mechanical and electrical engineer; 19 years' broad manufacturing experience; design of special and automatic machinery, tools, etc.; production superintendent for stamped and interchangeable work. Competent to take charge of engineering department or supervise production along modern economical lines. Greater New York preferred. SM-6283.

EXECUTIVE POSITION desired in industrial plant by engineer familiar with modern business and shop administration, engineering and design. Experience covers hoisting and mining machinery, cranes and paper working machinery. Would consider position of sales engineer. Age 29. Prefer to locate in East. SM-6284.

MECHANICAL AND CHEMICAL ENGINEER, age 33. Experienced in manufacture of chemicals and paint pigments both from research and operating standpoint; also 4 years' successful selling experience. Can design and operate chemical plant and look after sale of product. Prefer small concern with possibilities of development. Salary $3,600. SM-6285.

MECHANICAL ENGINEER, married; 11 years' experience, plant layout and design, installation, selection and supervision of design of equipment. Desires connection in or near Philadelphia, on development of work from laboratory research and specifications. Would consider position on board, if chances for advancement are good. Salary desired $3,000. SM-6286.

YOUNG MECHANICAL ENGINEER, Stevens graduate, desires connection either as junior executive in some capacity wherein ability and experience in steam-engineering research or experimental work is essential, or with general consulting concern where training and knowledge of engineering would be exercised. Experienced as teacher of experimental and mechanical engineering. Resourceful, conscientious and capable. At present employed but available at short notice. Best references as to ability, character and personality. Metropolitan district preferred. SM-6287.

PRODUCTION ENGINEER. Mechanical engineer, Stevens 1918; age 27. Have had basic machine shop and plant experience. SM-6288.

INDUSTRIAL EXECUTIVE, skilled in modern methods of manufacturing apparatus, design and tooling, production and cost control. Thorough accountant. Resourceful harmonizer of both male and female labor securing highest output without interruptions or dissatisfaction. Technical graduate; business trained in management and marketing covering 20 years with nationally prominent institutions. SM-6289.

ENGINEER EXECUTIVE for plant design, construction, maintenance, etc.; technical graduate; age 35; also Assoc. Mem. A.S.C.E.; 14 years' experience, last 9 years in office and field on design and construction of railway and industrial plant and buildings, executive work, purchasing, supervision, etc. Officer of Engineers, A. E. F. SM-6290.

FACTORY EXECUTIVE, 14 years' usually broad experience in factory production work; includes service as machinist, draftsman, inspector, foreman, superintendent, and works manager. Technical graduate; age 38. Interested in connection as works manager or service manager. SM-6291.

MECHANICAL ENGINEER, age 27; technical graduate; married; 3 years' experience in design.

shops, construction and estimating work. Officer in army during war. Desires commercial or technical position with good future. New York or vicinity preferred, but willing to go elsewhere. SM-6292.

SALES APPRENTICE COURSE of not over one years' duration that will lead to location in the South desired by mechanical engineering graduate of southern University of recognized standing. Age 24; resourceful, strong personality; good health. SM-6293.

ENGINEERING EXECUTIVE, having broad experience in charge of construction, organization and operation of some largest chemical plants in country, open for new position on or about July 1. Salary $7,500. Excellent and influential connections. Willing to consider proposition in any part of world. SM-6294.

MECHANICAL ENGINEER, superintendent or sales engineer. Technical graduate; married; age 33; 11 years' experience having specialized in industrial and steam power plant lines. Can handle building end as well as mechanical equipment. Design, construction, investigations, reports, general maintenance and efficiency work. Would consider sales proposition. Available immediately. Location New York or vicinity. SM-6295.

TECHNICAL GRADUATE, age 26; single; experienced in power plant operation and tests, drafting and textile plant maintenance. Desires permanent connection with progressive concern. Salary secondary to future opportunity. References present and past employer. SM-6296.

ENGINEER, chemical, recent graduate; thorough training in mechanical engineering. Experienced in dry-cell manufacture. Aggressive and resourceful. Natural inclination leads to desire for location along sales and merchandizing lines. At present employed but available on short notice. SM-6297.

EXECUTIVE ENGINEER, also Assoc. Mem. A.S.C.E.; age 37; married; 18 years' valuable experience in design, construction, maintenance and alteration of industrial buildings and plants and their mechanical equipment. Also experienced in quantity production including close-limit gage work for interchangeability. Have worked up from draftsman to executive engineer. Position desired as works engineer or similar responsible assignment. Available at once. SM-6298.

GRADUATE ENGINEER with 15 years' experience in design, construction and combustion work with public service and private power plants; also purchasing and sales experience. Desires permanent position in executive work with reliable company. Age 37; married. SM-6299.

MECHANICAL ENGINEER, age 36. Experienced plant executive; 10 years' active experience field and office, design, erection, operation and maintenance of power and industrial plants; specialist on steam power and pumping plants, turbo-generators, hydraulic mining and dredging. Discharged after two years' service as Captain Engineers and desires connection Pacific coast or Inter-mountain states. Available October 1. SM-6300.

CONTRACT MANAGER, graduate engineer with 8 years' practical experience in writing, handling and execution of engineering contracts; open for engagement with responsible corporation. Have been handling contracts and contract work during past 5 years amounting to millions of dollars. Position should offer some inducement for ambitious young engineer. SM-6301.

MECHANICAL ENGINEER, technical graduate, single; age 33; 14 years' experience in design, construction in power plants, heating, ventilation, industrial plants, maintenance work, reports, correspondence and inspection of branch plants in U. S. Was engineer in Navy. Working knowledge of German. Desires change with future. Location immaterial. Salary $4,000. SM-6302.

New Members of the Society

The following is a list of those who have qualified for membership in the Society between the dates of February 1 and March 25, 1921. The grade is indicated by the symbol after the name; i. e., M-Member; A-Associate; AM-Associate-Member; J-Junior.

ABELS, I. C.—J, Brooklyn, N. Y.
ACKERMAN, FRANK J.—AM, Buffalo, N. Y.
ADAMSON, ALLAN A.—AM, Rochester, N. Y.
ALVARADO, SALVADOR E.—J, Dearborn, Mich.
ANDERSON, CHARLES E.—M, New York, N. Y.
ANDERSON, HELMER N.—J, Harrison, N. J.
APPLEBAUM, SAMUEL B.—AM, New York, N. Y.
ARMSTRONG, CHARLES H.—J, New York, N. Y.
ARNOLD, ROY F.—AM, River Point, R. I.
ASKEW, MILES A.—AM, Chicago, Ill.
ATKINSON, GEO. P.—AM, Cleveland, Ohio.
AUGUR, ROBT. C.—M, New York, N. Y.

BAILEY, C. J.—J, Bridgeport, Conn.
BAIRD, HOBART B.—M, New York, N. Y.
BALDAUF, WILLARD W.—AM, Stamford, Conn.
BALLOU, W. A.—M, Washington, D. C.
BALTZLY, CLIFFORD C.—AM, Philadelphia, Pa.
BARR, SAMUEL D.—AM, Brooklyn, N. Y.
BARRETT, ALFRED L.—M, New Haven, Conn.
BARTELS, W. ALLEN—M, Erie, Pa.
BARTEN, EDWARD A.—J, Philadelphia, Pa.
BARTHEL, OLIVER E.—M, Detroit, Mich.
BASSETT, BURDETT E.—J, Pittsburgh, Pa.
BATTU, LEOPOLD P. L.—M, New York, N. Y.
BAUMAN, EDWARD—M, New York, N. Y.
BEALE, LEONARD T.—M, Philadelphia, Pa.
BEAMAN, D. F.—M, Houston, Tex.
BEAN, KARL D.—J, Boston, Mass.
BEANS, WALTER H.—AM, Brooklyn, N. Y.
BEAVAN, BENJ. A.—J, Philadelphia, Pa.
BECKHORN, WALTER R.—AM, Brooklyn, N. Y.
BEERS, HENRY S.—J, Bridgeport, Conn.
BEGLEY, RICHARD W.—M, New York, N. Y.
BELLIS, WILLIAM C.—J, Philadelphia, Pa.
BENEDICT, CHAS. H.—M, Sheboygann, Wis.
BENNEY, WILLIAM A.—AM, West Orange, N. J.
BENZIGER, JAKE U.—AM, Clanton, Ala.
BERCETCHE, FIRMO, JR.—AM, Los Angeles, Cal.
BERTELSEN, VALDEMAR—AM, New York, N. Y.
BILLIPP, ERNEST H.—M, New York, N. Y.
BINDIN, HUGH D.—AM, Buenos Aires, S. A.
BINNS, ARTHUR W.—J, Philadelphia, Pa.
BIRD, CHARLES T.—M, Detroit, Mich.
BLANDFORD, JOHN B., JR.—J, New York, N. Y.
BLOSS, LEONARD C. M.—Duquesne, Pa.
BODE, JOHANNES C. P.—AM, Worcester, Mass.
BOLLES, FREDERICK N.—M, Boston, Mass.
BOLTON, WM. R.—AM, New York, N. Y.
BONNER, ROBERT P.—J, Boston 9, Mass.
BONSTOW, THOMAS L.—M, London, Eng.
BORN, FRANK J.—AM, Milwaukee, Wis.
BOSCH, C. E.—J, E. Cambridge, Mass.
BOSMA, DIEDRICH J.—AM, Aberdeen, S. D.
BOWEN, CLARENCE A.—M, Lowell, Mass.
BOWLUS, GLENN H.—AM, Pasadena, Cal.
BRADLEY, ALEXANDER—A, New York, N. Y.
BRADLEY, JAMES H.—AM, Toronto, Ont., Can.
BRENDLIN, HERMAN J.—M, New York, N. Y.
BRIDGEWATER, HERBERT E.—M, Syracuse, N. Y.
BRODY, ISAAC—J, New York, N. Y.
BROOKE, IRVING E.—M, Chicago, Ill.
BROWN, ALBERT K.—J, Philadelphia, Pa.
BUCHERT, HARRY—AM, New York, N. Y.
BUCKER, PAUL—AM, Columbus, Ohio.
BUCKLEY, DANIEL J.—J, Pittsburgh, Pa.
BUELL, WILLIAM C., JR.—M, Pittsburgh, Pa.
BULLOCK, H. LESLIE—J, Newark, N. J.
BURFORD, ROBERT A., JR.—A, Birmingham, Ala.
BURGESS, KENNETH A.—AM, West Toronto, Ont., Can.
BURPEE, CHANDLER—J, Philadelphia, Pa.
BURT, WALTER R.—AM, New York, N. Y.
BUSHNELL, CLIFFORD D.—M, Lafayette, Ind.
BUTTERFIELD, FREDERICK C.—A, Woonsocket, R. I.
BUXBAUM, SAUL L.—J, Brooklyn, N. Y.

CALLAWAY, CLARENCE R.—M, Honesdale, Pa.
CAMDEN, ALEXANDER T.—AM, New York, N. Y.
CAMMARATA, FRANK—J, New York, N. Y.
CAMP, WM.—M, Plainfield, N. J.
CAMPBELL, ROBERT H.—AM, Decatur, Ill.
CANAN, WM. D.—AM, Milwaukee, Wis.
CARLSON, HARRY—AM, New York, N. Y.
CARPENTER, SAMUEL D.—AM, St. Louis, Mo.
CARPLES, VICTOR H.—AM, New York, N. Y.
CARR, WALTER DEL.—M, Hammond, Ind.
CARTER, JAMES H.—J, E. St. Louis, Ill.
CARTER, WILLIAM P.—M, New York, N. Y.
CARTY, MAURICE W.—M, Boston, Mass.
CASEY, ALBERT A.—J, Cleveland, Ohio.
CHAPMAN, WM. H.—M, New York, N. Y.
CHARLES, HENRY E.—AM, Paterson, N. J.
CHILDS, GEORGE W.—M, Chester, Pa.
CHRISTIE, MORRIS—AM, New York, N. Y.
CHRISTIANSEN, GEORGE—J, Watervliet, N. Y.
CHURCH, LLOYD M.—AM, Hartford, Conn.
CLARK, LINCOLN—J, Cambridge, Mass.
CLARK, PHILIP C.—AM, Garfield, N. J.
CLOYD, EDWARD L.—AM, West Raleigh, N. C.
COLLINS, JOHN, JR.—AM, New York, N. Y.
CONLON, WILLIAM T.—J, Philadelphia, Pa.
COOK, HENRY R., JR.—M, Baltimore, Md.
COOPER, FRANK H.—J, Atlanta, Ga.
COPPOCK, WALTER J.—J, Philadelphia, Pa.
COVE, CHARLES H.—AM, West Warren, Mass.
CROCKER, HAROLD W.—J, Boston, Mass.
CROFT, TERRELL—M, St. Louis, Mo.
CRONHOLM, FREDERICK N.—AM, Calexico, Cal.
CROSBY, GEO. W.—J, Seward, Pa.
CUNEO, ALBERT R.—J, Jersey City, N. J.
CUNNINGHAM, ROBERT O.—AM, Braintree, Mass.
CURTIS, LEWIS B.—M, Bridgeport, Conn.

DANIEL, CHARLES M.—J, Mt. Vernon, N. Y.
DANIELS, RICHARD F.—AM, Seattle, Wash.
DART, EDWARD W.—M, New York, N. Y.
DAVIDSON, EZRA D.—AM, Ansonia, Conn.
DAVIDSON, JOSEPH—M, Atlanta, Ga.
DAVIS, ALLAN I.—AM, North Adams, Mass.
DAVIS, D. LOREN—J, DesMoines, Ia.
DAVIS, DANIEL L.—J, Worcester, Mass.
DAVIS, WILLIAM H.—AM, Baltimore, Md.
DAY, DONALD M.—J, Sellers, La.
DAY, DONALD W.—AM, San Francisco, Cal.
DeCAMP, WITSEL R.—A, Newark, N. J.
deCORIOLIS, ERNEST G.—M, Winchester, Mass.
DELERY, EUGENE F.—M, New Orleans, La.
DERVAUX, JOSEPH—J, Oil City, Pa.
DeVOE, BENJAMIN H.—J, Fremont, Ohio.
DIAMAANO, GREGORIO C.—J, Baliway, Bulcan, P. I.
DICKSON, GEO. L.—M, Cincinnati, Ohio.
DiDOMENICO, ANTHONY F.—J, Baltimore, Md.
DIERCKX, JULES—A, Brooklyn, N. Y.
DIETZ, LEWIS H.—J, Dorchester, Mass.
DIXON, LEON S.—M, Mattawa, Ont., Can.
DOW, RICHARD F.—M, Hartford, Conn.
DOWLING, NORTH, JR.—AM, Wilmington, Del.
DRAKE, ERNEST A.—M, Chicago, Ill.
DUNLAP, EDGAR F.—J, Atlanta, Ga.
DUNN, ROLAND I.—J, Lester, Pa.
DUPEE, CHAS. F.—M, Atlanta, Ga.
DuPUY, THOMAS F.—M, Buffalo, N. Y.
DURBIN, WM. O.—AM, Buffalo, N. Y.
DWYER, JAMES P., JR.—AM, Boston, Mass.

ELDERKIN, ARTHUR T.—AM, Philadelphia, Pa.
ELLIOTT, EDWARD—M, Worcester, Mass.
ELLIS, GERSHOM P.—J, Boston, Mass.
EMMONS, E. N.—J, Harrison, N. J.
ENGELMAN, HERMAN C.—AM, Harrison, N. J.
EVERITT, GEORGE G.—J, New York, N. Y.

FAGG, GEORGE E.—J, Stonega, Va.
FALES, HERBERT G.—J, Cambridge, Mass.
FARRELL, THOMAS A.—J, Newark, N. J.
FAUNCE, B. WARREN—AM, Camden, N. J.
FAUST, P. A.—M, Miami, Ariz.
FAY, SAMUEL W.—AM, Bridgeport, Conn.
FELTON, GEO. W.—M, Syracuse, N. Y.
FERRIER, CHAS. C.—J, Brooklyn, N. Y.
FERRIS, JOHN T.—J, Syracuse, N. Y.
FISH, ROGER E.—J, Erie, Pa.
FISK, FREDERICK M.—J, E. Cambridge, Conn.
FITCH, EDWARD A.—A, Yonkers, N. Y.
FITGERALD, HARRISON W.—M, Buffalo, N. Y.
FLINCHBAUGH, DONALD F.—AM, Boston, Mass.
FOGG, ERLON S.—M, New York, N. Y.
FORSYTHE, JAS. B.—AM, Dayton, Ohio.
FOSTER, CHARLES B.—AM, Bridgeport, Conn.
FOX, WINTERS B.—J, Philadelphia, Pa.
FRANCIS, WILLIAM M.—M, Atlanta, Ga.
FRASER, WARREN F.—M, Westboro, Mass.
FREMONT, ELMER G.—A, New York, N. Y.
FULLER, GEORGE F.—M, Worcester, Mass.
FULSON, HIRAM O.—AM, Columbia, S. C.

GAINES, WALTER S.—AM, Mobile, Ala.
GAITHER, GEO. M., JR.—AM, Baltimore, Md.
GALLAGHER, DAVID—M, Jersey City, N. J.
GALLAGHER, J. J.—AM, Chattanooga, Tenn.
GEARING, CHARLES M.—M, Meriden, Conn.
GEE, WALTER S.—A, New York, N. Y.
GENZ, HENRY EDWARD—J, Atlanta, Ga.
GERKEN, EDWARD R.—J, Brooklyn, N. Y.
GILCREST, MURRAY H.—M, Sand Springs, Okla.
GILES, WALTER C.—J, Boston, Mass.
GOEBEL, WM. H.—J, Brooklyn, N. Y.
GOGAN, JOSEPH—M, Detroit, Mich.
GOLDTHWAIT, JOEL A.—J, Providence, R. I.
GORMLEY, JOSEPH E.—AM, Harrison, N. J.
GOTTSCHAU, CHRISTIAN M.—M, Denver, Colo.
GRAHAM, HUGH U.—J, Rome, N. Y.
GREENIDGE, E. T. P.—M, Huntington, Ind.
GRETHER, EDWARD C.—M, New York, N. Y.
GRIMMER, ERNEST A.—J, Hamilton, Ohio.
GUGGISBERG, CHARLES F.—J, Minneapolis, Minn.

HARDING, ROY C.—AM, Cleburne, Tex.
HARPER, WILLIAM S.—A, Newark, N. J.
HARRIS, ANDERSON W.—AM, Chattanooga, Tenn.
HARRIS, CHARLES H.—M, Keokuk, Ia.
HARRIS, ERNEST N.—AM, Seattle, Wash.
HARSEN, OTIS Y.—M, New York, N. Y.
HART, WALTER H.—M, New Britain, Conn.

HARTEN, JOHN—AM, Hartford, Conn
HAYES, WILLIAM E.—M, S. Charleston, W. Va.
HAYWARD, RALPH A.—AM, New York, N. Y.
HAZEN, S. A.—AM, Newark, N. J.
HEATLEY, FREDERICK—J, Readville, Mass.
HEDBERG, HAROLD F.—J, Bangor, Me.
HEGARTY, WILLIAM—AM, Bloomfield, N. J.
HEIBEL, WALTER E.—M, New York, N. Y.
HENCH, WM. M.—M, Kearney, N. J.
HENDERSON, ROBERT M.—AM, Attalla, Ala.
HERON, CHARLES M.—J, Lester, Pa.
HESCOCK, ETHAN N.—AM, New York, N. Y.
HILL, CHARLES F.—J, Boston, Mass.
HILL, FRED C.—AM, Syracuse, N. Y.
HILLS, LESLIE W.—J, San Francisco, Cal.
HOFFINGHOFF, ARTHUR C.—A, Cincinnati, Ohio
HOFFMANN, BALTHASAR, JR.—AM, Milwaukee, Wis.
HOGE, FREDERICK H.—M, Chicago, Ill.
HOLLANDER, OTTO—J, Bethlehem, Pa.
HOMAN, WM. C.—M, Meriden, Conn.
HOPPE, ROLAND C.—J, Port Arthur, Tex.
HORIGAN, JOHN H.—AM, Athol, Mass.
HOUGH, ULYSSES—M, Spokane, Wash.
HOUGHTEN, FERRY C.—AM, Pittsburgh, Pa.
HOUSTON, GRAY J.—AM, New York, N. Y.
HUBBINETTE, CARL W.—AM, Jersey City, N. J.
HUMMEL, JESSE G.—M, Ames, Ia.
HUNT, JAMES E.—AM, Philadelphia, Pa.
HUNTER, CLARENCE J.—A, Philadelphia, Pa.
HUNTER, RONALD C.—J, Columbus, Ohio
HUTCHINSON, ADELBERT A.—M, Atlanta, Ga.
HYDE, ERWIN C.—AM, Binghamton, N. Y.

INGALLS, ELROY D.—J, Providence, R. I.
IVES, GEORGE C.—J, Lester, Pa.

JACKSON, ALEXANDER F.—AM, New York, N. Y.
JACKSON, SAMUEL D.—J, New Orleans, La.
JARVIS, MARSHALL N.—AM, Gildersleeve, Conn.
JOHN, EDWARD T.—J, Wausaw, Wis.
JOHNSON, PAUL R.—M, Worcester, Mass.
JOHNSON, WILLS—M, Wilmington, Del.
JONES, ALONZO L., JR.—J, Holyoke, Mass.
JONES, J. BARCLAY, JR.—J, Passaic, N. J.
JONES, JOHN T.—M, New Orleans, La.
JONES, LESTER M.—AM, New York, N. Y.
JONES, YEAMANS P.—J, Philadelphia, Pa.
JOOS, CHAS. E.—J, Philadelphia, Pa.
JUNE, ROBT.—AM, Detroit, Mich.
JUSTICE, ITHAMAR M.—A, Dayton, Ohio

KATZENMEYER, JOHN A.—M, Ellwood City, Pa.
KELLY, JOSEPH M.—J, Pittsburgh, Pa.
KELLY, JOSEPH T., JR.—M, Mansfield, Ohio
KELLY, PHILIP M.—J, Jersey City, N. J.
KENDRICK, WARREN F.—M, Detroit, Mich.
KENT, LAURENCE F.—J, Atlanta, Ga.
KERR, EDWARD A. N.—J, New York, N. Y.
KIRKBERG, HERMAN A.—AM, West Orange, N. J.
KIRKPATRICK, CRAWFORD N.—A, Waynesboro, Pa.
KITTREDGE, BERTIE L.—AM, Hawkesbury, Ont., Can.
KIVLIN, ALFRED P.—AM, N. Attleborough, Mass.
KLEIN, LOUIS W.—AM, Port Carbon, Pa.
KLEINSCHMIDT, ROBERT—J, Cambridge, Mass.
KLIPPEL, GEO. H.—AM, Newport News, Va.
KNERR, DAN. G.—AM, Dayton, Ohio
KRELLEN, HARRY I.—J, New York, N. Y.
KULP, HENRY B.—J, Phoenixville, Pa.

LaCROSSE, EMMETT—M, New York, N. Y.
LAKE, EVERETT J.—M, Hartford, Conn.
LANCE, WILLIAM W.—J, Hartford City, Ind.
LANDIS, LAWRENCE H.—M, Harrisburg, Pa.
LAWTON, FRANK W.—J, Philadelphia, Pa.
LEIGHTON, MARSHALL O.—M, Washington, D. C.
LEWIS, BENJ. L.—A, New York, N. Y.
LEWIS, RICHARD C.—J, Ansonia, Conn.
LIEBREICH, OSCAR P.—J, New York, N. Y.
LINCOLN, CHARLES S.—M, Milwaukee, Wis.
LINDQUIST, DAVID L.—M, New York, N. Y.
LITTLE, WILLIAM R.—AM, Boston, Mass.
LOEB, ALBERT L.—AM, Atlanta, Ga.
LONGERGAN, J. E.—M, Philadelphia, Pa.
LUBASH, MARTIN—J, Richmond Hill, L. I., N. Y.
LUPTON, EDGAR B.—AM, Little Falls, N. J.
LUTHER, BENJAMIN S.—AM, Philadelphia, Pa.
LYNCH, DANIEL J., JR.—J, Lynn, Mass.
LYNCH, JOHN E., JR.—AM, Boston, Mass.

McCARTY, JAMES E.—J, New York, N. Y.
McCONALD, WM. H.—M, New York, N. Y.
MacCULLOUGH, GLEASON H.—J, Worcester, Mass.
McDOWELL, DAVID W.—J, Wissinoming, Pa.
McCUTCHEN, ROY M.—J, Camp Benning, Ga.
McFARLAND, CHARLES T.—AM, Kansas City, Mo.
McGINN, EDWARD J.—AM, New York, N. Y.
McGREGOR, HOWARD L.—AM, Detroit, Mich.
McLAUGHLIN, JOHN E.—J, Jersey City, N. J.
McLOUGHERY, CHAS.—M, Philadelphia, Pa.
McMEEKIN, BOWMAN M.—M, Shelton, Conn.
McNEAR, GEORGE R.—J, Boston, Mass.
MALLOY, JOHN D.—AM, Hartford, Conn.
MANGER, PAUL A.—J, Buffalo, N. Y.
MANN, OLIVER—AM, Ft. Worth, Tex.
MARKER, ROLAND H.—J, Toledo, Ohio
MARSHALL, DAVID L.—AM, Philadelphia, Pa.
MARSHALL, HENRY H.—M, Hartford, Conn.
MASEK, JOHN A.—M, Milwaukee, Wis.
MASON, WENDELL E.—J, Ann Arbor, Mich.
MASSINI, I. J.—J, Schenectady, N. Y.
MATCHETT, THOMAS—M, New York, N. Y.
MATHER, ARCHIE J.—M, Kewanee, Ill.
MAXWELL, HARRY—M, New York, N. Y.
MEADE, NORMAN G.—A, Atlanta, Ga.
MEANY, EDWARD A.—J, Brooklyn, N. Y.
MERRITT, LUCIUS R.—AM, New York, N. Y.
MERRITT, RALPH N. S.—J, Worcester, Mass.
MESTA, MERLE A.—J, Pittsburgh, Pa.
MEYER, HERMAN F.—J, Brooklyn, N. Y.
METZ, WILLIAM R.—J, Ensenda, P. R.
MILLAR, ROBERT E.—AM, Philadelphia, Pa.
MILLER, LEROY J.—J, Brooklyn, N. Y.
MILLER, JAY C.—AM, Lebanon, Pa.
MILLER, WM. A.—J, Buffalo, N. Y.
MITCHELL, GEORGE W.—AM, St. Louis, Mo.
MOLLER, KENNETH—M, Boston, Mass.
MITRA, DHIRENDRA N.—J, West Lynn, Mass.
MONTALVO, WILLIAM W., JR.—M, New York, N. Y.
MONTGOMERY, ORA C.—M, New York, N. Y.
MOOHL, JOHN G. J.—M, Cleveland, Ohio
MOORE, CLAYTON H.—AM, New York, N. Y.
MOORE, H. CLAY—A, Atlanta, Ga.
MORROW, S. L.—M, Birmingham, Ala.
MORSE, JAMES L.—M, Golden, Colo.
MUHRER, H. L.—AM, New York, N. Y.
MUNIER, LEON L.—AM, New York, N. Y.
MURRAY, FREDERICK F.—J, St. Louis, Mo.

NASH, HOWARD B.—M, Chicago, Ill.
NAWRAT, STEPHEN J.—J, New York, N. Y.
NEAL, GEORGE A.—AM, Michigan City, Ind.
NEFF, EARL C.—J, Royal Oak, Mich.
NEWMAN, JOSEPH, JR.—J, Philadelphia, Pa.
NEXSEN, RANDOLPH H.—M, New York, N. Y.
NOLAND, SOLLIE C.—AM, Atlanta, Ga.
NORDBERG, BRUNO V. E.—M, Milwaukee, Wis.
NORMAN, ROY A.—M, Ames, Ia.
NORTH, RICHARD A.—J, New York, N. Y.
NORTHEND, ALLAN P.—M, Hartford, Conn.
NUNAN, THOMAS R.—AM, Atlanta, Ga.

O'BRIEN, EDWARD J.—J, St. Louis, Mo.
OLIND, JOHN H.—J, Meriden, Conn.
OLSEN, WM.—J, New York, N. Y.
O'NEILL, WM. E.—J, Elizabeth, N. J.
OWEN, CHARLES D.—AM, Passaic, N. J.

PACK, EUGENE P.—J, Cambridge, Mass.
PADDOCK, RUSSELL G.—J, Connersville, Ind.
PANERO, GUY B.—J, New York, N. Y.
PARKER, FRANK E.—AM, Boston, Mass.
PARKER, JOHN—M, New York, N. Y.
PARKES, GEORGE H.—J, Williamsport, Pa.
PARSONS, CHAS. J.—J, New York, N. Y.
PATTISON, GEORGE B.—M, Detroit, Mich.
PEARCE, LESTER F.—AM, Philadelphia, Pa.
PEEHL, CARL F.—J, Edgewater, N. J.
PEYSER, HAROLD—A, New York, N. Y.
PFEIL, WALTER G.—AM, Passaic, N. J.
PLATZ, EDWARD H., JR.—AM, Chicago, Ill.
PORTEOUS, EDWARD J.—M, Lompoc, Cal.
PRAY, JOHN W.—AM, Ft. Dodge, Ia.
PRENDERGAST, RICHARD F.—AM, New York, N. Y.
PUC, VOJTECH—AM, L. I. City, N. Y.

RADERMACHER, LAWRENCE J.—J, Appleton, Wis.
RAINEY, MORTON J.—J, New Bedford, Mass.
RATHMELL, JOHN M.—AM, Conneaut, Ohio
RAYNER, LESTER H.—M, New Orleans, La.
RECH, PHILIP D.—J, Philadelphia, Pa.
REED, FRANCIS T.—J, Charleston, S. C.
REICHARD, HARRY G.—J, St. Louis, Mo.
REIDINGER, MAXWELL L.—M, Elizabethport, N. J.
REKER, CARL H.—J, New Haven, Conn.
RENNIE, JOHN A.—M, New York, N. Y.
REYNOLDS, FRANCIS J.—J, Waterbury, Conn.
REYNOLDS, LEWIS M.—J, Liberty, N. Y.
RHEINFELDT, JOHN T. B.—AM, Wilkes-Barre, Pa.
RHOADS, BURT L.—M, Denver, Colo.
RIGA, ANDREW J.—J, Hartford, Conn.
RIORDAN, JOHN M.—M, Cleveland, Ohio
RISLEY, WALTER J., JR.—J, Philadelphia, Pa.
ROBERTS, JAMES T., JR.—J, Memphis, Tenn.
ROCKMAN, W. H., JR.—AM, Tulsa, Okla.
ROBINSON, HUGH A.—AM, Keyport, N. J.
RODGERS, PAUL C.—J, New York, N. Y.
ROGERS, FRANCIS C.—AM, Gloucester City, N. J.
ROOT, WARREN S.—AM, Elizabeth, N. J.
ROSBOROUGH, JAMES G., JR.—AM, St. Louis, Mo.
ROSE, ALEXANDER—M, Greenville, S. C.
ROSEN, THEODORE—J, New York, N. Y.
ROSS, THEODORE H.—J, Pittsburgh, Pa.
RUSHTON, LEON E.—AM, Sacramento, Cal.
RUSSELL, JAMES W.—AM, New Haven, Conn.
RUTH, JAMES E.—AM, Madison, Wis.
RYMAN, CHARLES F.—J, Pittsburgh, Pa.

SADLER, ROBT. A.—J, Brooklyn, N. Y.
SANDO, FRANCIS B.—J, New York, N. Y.
SAVNER, LAURENCE—AM, Detroit, Mich.
SCALLY, ROBT. A.—AM, Eldorado, Kans.
SCHAEFER, EDWARD E.—J, New York, N. Y.
SCHAFTER, ROY A.—AM, Milwaukee, Wis.
SCHALLER, GILBERT S.—J, Mendota, Ill.
SCHEN, AUGUSTUS R.—M, Lowell, Mass.
SCHERER, FRANK J.—J, Newark, N. J.
SCHICKEL, NORBERT H.—M, Stamford, Conn.
SCHMIDT, ALBERT G.—M, Montour Falls, N. Y.
SCHMIDT, CARL W.—J, Philadelphia, Pa.
SCHOCH, NORMAN H.—AM, Philadelphia, Pa.
SCHOFIELD, HAROLD E.—AM, Philadelphia, Pa.
SCHRADER, LLOYD F.—AM, New York, N. Y.
SCHRAMM, C. HENRY, JR.—J, Philadelphia, Pa.
SCHROEDER, FRED A.—M, New York, N. Y.
SCHUNCK, CARL F.—M, Ansonia, Conn.
SCHUSSLER, WALTER H.—M, Philadelphia, Pa.
SCHWARTZ, EDWARD H.—J, New York, N. Y.
SCHWARTZ, WALTER E. D.—J, Detroit, Mich.
SCHWEISTHAL, FRED G.—AM, Chicago, Ill.
SCOTT, HARRY E.—M, Cleveland, Ohio
SCOTT, RUMSEY W.—M, New York, N. Y.
SCOTT, JOHN T.—M, San Francisco, Cal.
SEARS, EDWARD A.—AM, New York, N. Y.
SEE, THEODORE S.—M, Pittsburgh, Pa.
SEGEL, JOSEPH—AM, Wilmington, Del.
SEMONSEN, OTTO C.—J, New York, N. Y.
SENTOR, CARL A.—AM, New York, N. Y.
SERENA, MICHAEL F.—J, Saugatuck, Conn.
SEVERSEN, BARNEY G.—AM, Chicago, Ill.
SEVLER, GEORGE A.—M, Cincinnati, Ohio
SHAFER, ALFRED E. M.—J, Palmerton, Pa.
SHAKMEN, JAMES G.—AM, Chicago, Ill.
SHANER, EARL L.—AM, Cleveland, Ohio
SIEGEL, DAVID T.—J, New York, N. Y.
SIRRINE, JOSEPH E.—M, Greenville, S. C.
SJOBERG, SIDNEY T.—AM, Harvey, Ill.
SLEEPER, PAUL DeVOE—AM, Newport News, Va.
SMITH, BRONSON H.—M, New York, N. Y.
SMITH, EDWIN R.—AM, Fitchburg, Mass.
SMITH, FLOYD T.—M, Schenectady, N. Y.
SMITH, GEO. J.—M, New York, N. Y.
SMITH, HAROLD E.—J, Jersey City, N. J.
SMITH, THEALL F.—J, Springdale, Conn.
SOLT, STANLEY O.—AM, Bethlehem, Pa.
SONTAG, MAX—J, Brooklyn, N. Y.
SOUDER, CLEMENT F., JR.—AM, Toledo, Ohio
SPIETH, BENJAMIN S.—AM, Madison, Wis.
SPILLANE, JOHN F.—AM, New Haven, Conn.
SPITZFADDEN, ALFRED E.—J, New York, N. Y.
STAGGS, HORACE M.—J, Florence, Kan.
STAUFFER, FRED—J, Cleveland, Ohio
STAVENSON, GEORGE K.—AM, New Haven, Conn.
STEINER, WALTER A.—J, New York, N. Y.
STEPHEN, ALEXANDER—AM, New York, N. Y.
STEVENS, CLARENCE C.—AM, Bristol, Conn.
STOELZER, WALTER H.—J, New York, N. Y.
STOKES, SAMUEL O.—J, New York, N. Y.
STOLZ, PAUL L.—M, Kansas City, Mo.
STRATTON, ALBERT C.—J, Passaic, N. J.
STUBBS, WILLIAM F.—M, Sarnia, Ont., Can.
STULL, EUGENE S., JR.—J, Brooklyn, N. Y.
SULLIVAN, LEO G.—AM, New York, N. Y.
SULLIVAN, WILLIAM L.—A, Tulsa, Okla.

TAIT, RALPH S.—J, Lawrence, Kan.
TANIS, GILBERT B.—AM, Paterson, N. J.
TATE, JAMES—J, Chicago, Ill.
TAYLOR, ALBERT H.—M, Phillipsburg, N. J.
TAYLOR, JESSE, JR.—AM, Philadelphia, Pa.
TAYLOR, THORON C.—M, Detroit, Mich.
TAYLOR, WM. D.—AM, Hawkesbury, Ont., Can.
TELL, LAWRENCE H.—AM, Salem, Mass.
TELLER, S. JAY—M, Hartford, Conn.
THIEL, B. C.—J, Mt. Vernon, Ohio
THOMPSON, CLIFFORD F.—J, Cambridge, Mass.
THOMPSON, F. ARCHER—M, Bridgeport, Conn.
THOMPSON, J. COX—M, Lemoyne, Pa.
THOMSON, THOMAS S.—M, Los Angeles, Cal.
TICKELL, STANLEY M.—J, New York, N. Y.
TIGER, HOWARD L.—J, New York, N. Y.
TIGWELL, PERCY H.—J, Beloit, Wis.
TODD, JOHN N.—M, Seattle, Wash.
TODD, MITCHELL—J, Lincoln, N. H.
TOEWS, GUSTAV P.—J, Washington, D. C.
TUCKER, RAYMOND R.—J, St. Louis, Mo.
TUFTS, WM.—M, Boston, Mass.

USENER, JOHN F.—M, Houston, Tex.

VanBUSKIRK, GEORGE L.—J, New York, N. Y.
VANCE, J. HENRY—M, Akron, Ohio
VAN DENVEER, T. W.—M, Dover, N. J.
VAN DOREN, W. D.—M, New York, N. Y.
VER PLANCK, WILLIAM E.—M, Schenectady, N. Y.

WALKER, WM. J.—J, Houston, Tex.
WALLACE, JAMES H.—M, Westerleigh, S. I., N. Y.
WALTON, EARLE—AM, Boston, Mass.
WARRICK, WOODWARD A.—AM, Indianapolis, Ind.
WATERMAN, BENJ. F.—M, Providence, R. I.
WATROUS, I. ALLEN—AM, Bridgeport, Conn.
WATSON, CLAUDE C.—J, Elizabeth, N. J.

WATSON, JAMES S.—M, Indianapolis, Ind.
WEI, TSEN FU—J, Bethlehem, Pa.
WEISS, MARMION M. L.—J, New York, N. Y.
WELLINGTON, C. OLIVER—A, Boston, Mass.
WELLS, WARREN M.—AM, Detroit, Mich.
WELLS, EDWARD H.—M, New York, N. Y.
WELTY, ALBERT B.—M, Rockford, Ill.
WEST, FRANK R.—J, Stamford, Conn.
WEYER, LEO O.—AM, New York, N. Y.
WEYL, PIERCE A.—J, Anderson, Ind.
WHEATON, WILLIAM E.—AM, Plainfield, N. J.
WHITAKER, OROON D.—M, Birmingham, Ala.
WHITFORD, ALEXANDER W.—M, New York, N. Y.
WILKS, VICTOR H.—M, New York, N. Y.
WILLIAMS, GARDNER S.—M, Ann Arbor, Mich.
WILLOUGHBY, VICTOR R.—M, New York, N. Y.
WILSON, ALEXANDER, 3RD—M, Philadelphia, Pa.
WILSON, HOWARD J.—AM, Philadelphia, Pa.
WOLFF, RICHARD A.—AM, New York, N. Y.
WOLLEN, CHARLES E.—AM, Baltimore, Md.
WOOD, GEORGE E.—M, New Haven, Conn.
WORDEN, BEVERLEY L.—M, West Orange, N. J.
WORLEY, FLOYD E.—AM, Williamsport, Pa.
WORTH, DANIEL B.—J, West Raleigh, N. C.
WORTH, HAROLD H.—J, New York, N. Y.
WUENKER, RALPH F.—J, Newark, N. J.
WURTH, WALTER A.—J, New York, N. Y.
YEAGER, LEO R.—AM, Pittsburgh, Pa.
YOUNG, PERCY A.—AM, Baltimore, Md.
ZILBOORG, JAMES M.—J, New York, N. Y.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER MAY 30, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically.

Unless objection is made to any of the candidates by May 30, 1921, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

SMITH, LEE R., Mechanical Draftsman, Anniston Steel Co., Anniston

California

FUNK, IRA B., Union Oil Co., of California, Los Angeles
GOSSMAN, ANGELO L., Western Division Manager, Celite Products Co., San Francisco
KOEBIG, ADOLF H., JR., Partner, Koebig & Koebig, Los Angeles
McDONOUGH, PATRICK W., Superintendent, Los Angeles Manufacturing Co., Los Angeles
MANGUN, LESLIE G., Works Engineer, El Segundo Refinery, Standard Oil Co., El Segundo
PEABODY, ROBERT M., Designing Engineer, Southern California Edison Co., Los Angeles

Colorado

POOL, RALPH V., General Superintendent, The Intermountain Railway, Light and Power Co., Colorado Springs

Connecticut

BAUER, PETER W., Instructor in Drafting, State Trade School, New Britain
BRIGHAM, FREDERICK W., Checker, Hartford Fairmont Co., Hartford
DARLINGTON, STEPHEN P., Student, Sheffield Scientific School, Yale University, New Haven
DWYER, WILLIAM S., Chief of Estimating Department, Bullard Machine Tool Co., Bridgeport
MacDONALD, NEIL M., Supervisor, Power Department, Winchester Repeating Arms Co., New Haven
SLEEPER, HAROLD R., Chief Draftsman, J. N. Lapointe Co., New London
VAN SILLER, ALFRED, Inspector, United States Navy, New Haven

Delaware

MERVINE, WILLIAM G., Assistant Engineer, Benjamin F. Shaw Co., Wilmington

District of Columbia

RUGGLES, COLDEN L., Chief of Technical Staff, Ordnance Department, U. S. A., Washington

Georgia

ADKERSON, BRANCH O., Student Engineer, American Telephone & Telegraph Co., Atlanta

Illinois

BIRKEBAK, CHRISTIAN A., General Foreman, Union Special Machine Co., Chicago
BUCKHAM, HENRY B., Sales and Designing Engineer, Allbright-Nell Manufacturing Co., Chicago
DIERCKS, EDGAR, Junior Mechanical Engineer, Sanitary District of Chicago, Chicago
DUTTON, ROBERT L., President, Key Boiler Equipment Co., East St. Louis
ELMENDORF, ARMIN, Consulting Engineer, Haskelite Manufacturing Corpn., Chicago
KEY, ELMER A., Superintendent of Construction, Key Boiler Equipment Co., East St. Louis
KRAUTHEIM, WILLIAM C., Estimator, Commonwealth Steel Co., Granite City
McDONNELL, EDWARD W., Engineer of Sales, Economy Engineering Co., Chicago
MOORE, JOHN J., Sales Manager, Thomas Elevator Co., Chicago
NELSON, JOHN A., Designing Engineer Power Plants, Sinclair Refining Co., Chicago
PETERSON, HAROLD C., Engineer, Swift & Co., Chicago
RAYMAKER, JAMES H., Industrial Supervisor, L. V. Estes, Inc., Chicago
REGENSBURGER, RICHARD W., Research & Test Engineer, Swift & Co., United States Yards, Chicago
SCHLEICHER, EMIL J., Construction Engineer, Commonwealth Steel Co., Granite City
TAYLOR, JOHN O., Consulting Engineer, Taylor & Jordan Engineers, Chicago
TOWLE, HOWARD A., Student Engineer, Western Electric Co., Chicago
TYDEMAN, FREDERIK W. L., Refinery Superintendent, Roxana Petroleum Corpn., Wood River

Indiana

COMBS, MAHLON A., Maxon Furnace & Engineering Co., Muncie

Kansas

AMBLER, HALFORD H., Civil Engineer and Chief Draftsman, The Solvay Process Co., Hutchinson
CAMPBELL, A. L., Chief Engineer, The Solvay Process Co., Hutchinson

Maryland

COEBEL, GEORGE, Supervisor Production Machinery, Crown Cork and Seal Co., Baltimore
McCURDY, CHARLES T., Consulting Engineer, Martin & Gardner, Baltimore

Massachusetts

BELDEN, ALBERT G., Mechanical Engineer, Norton Co., Worcester
BENOIT, ARMAND W., Assistant Engineer, Chas. T. Main, Boston
BRISTOL, BENJAMIN H., 2nd, Assistant Superintendent, The Foxboro Co., Foxboro
CAHILL, JAMES H., Head of Engineering Department, Lapointe Machine & Tool Co., Hudson
CHEEVER, PAUL, Superintendent of Power, Merrimac Chemical Co., Boston
FEACEY, EDWIN T., New England Oil Refining Co., Fall River
FLETCHER, HERBERT L., Engineer, A. B. See Electric Elevator Co., Boston
GODDEN, HARRY M., Designing and Construction Engineer, The Lamson Co., Boston
KING, EVERETT F., Safety Engineer, H. A. Hale, Jr., & Co., Boston
LAWRENCE, ALMON R., Assistant Engineer Edison Electric Illuminating Co. of Boston, Boston
McCULLOCH, ALBERT M., General Manager, McCulloch Manufacturing Co., Boston
MAHAN, JOE-R., Graduate Student, Massachusetts Institute of Technology, Cambridge
MANDELL, IRVING F., Mechanical Engineer, Watertown Arsenal, Watertown
OLEWINE, GEORGE A., New England Oil Corpn., Fall River
OSGOOD, WILLIAM R., Assistant in Mechanical Engineering, Massachusetts Institute of Technology, Cambridge
PARENT, JOSEPH V., Mechanical Draftsman, Reed-Prentice Co., Worcester
SMITH, CHETWOOD, President and General Manager, Stack Heater Co., Boston
SOUTHWICK, ARTHUR M., Machine Designer, Bird & Son, East Walpole
STEINBACH, EDWARD S., Mechanical Engineer, Stone & Webster, Inc., Boston
TAYLOR, IRVING A., Chief Engineer, Sanford Riley Stoker Co., Worcester
WILCOX, WILLIAM, District Engineer, Whitlock Coil Pipe Co., Boston
WILDER, CHARLES J., Chief Engineer, Washington Mill, American Woolen Co., Lawrence
WILLIAMS, FRANK E., Construction Foreman, Turbine Department, General Electric Co., Boston

Michigan

BEGEMAN, MYRON L., Instructor of Mechanical Engineering, University of Michigan, Ann Arbor
STACY, JOHN A., Machine Tool Salesman, Peninsular Machinery Co., Detroit

Minnesota

JOHNSON, HELGE R. N., Sales Engineer, Sales and Engineering Co., Minneapolis
ROBERTSON, BURTON J., Assistant Director, Experimental Engineering Laboratory, University of Minnesota, Minneapolis

Missouri

FREDERICKS, CHARLES C., Vice-President and General Manager, St. Louis Pump and Equipment Co., St. Louis
MEYER, CHARLES W., Designing Engineer, Busch-Sulzer Bros. Diesel Eng. Co., St. Louis
NORDMEYER, CARL L., Sales Engineer, Tait & Nordmeyer Engineering Co., St. Louis
VEATCH, N. T., JR., Black & Veatch, Kansas City

New Hampshire

LEARNARD, HARRY DEW., Mechanical Superindent, Great Falls Manufacturing Co., Somersworth

New Jersey

BEY, GEORGE H. T., Inventor and President, Hudson Pump Co., Inc., Jersey City
BLAIR, J. ARTHUR, Assistant to Superintendent of Equipment, Joseph Campbell Co., Camden
CHASON, DANIEL H., Mechanical Engineer, Singer Manufacturing Co., Elizabethport
D'AIELLO, MARIANO J., The Babcock & Wilcox Co., Bayonne
GUEMPEL, ROBERT R., Tool and Machine Designer, Klaxon Co., Newark
HARNED, GEORGE T., Boiler-room Superintendent, United States Metals Manufacturing Co., Chrome
JACOBSON, HUGO W., Assistant Chief Engineer, Gould & Eberhardt, Irvington
KLEIN, HENRY G., Trouble Test Engineer, Babcock & Wilcox Co., Bayonne
LEIS, JAMES W., Superintendent, Magor Car Corpn., Clifton
LOTT, SAMUEL H., Assistant Professor, Stevens Institute of Technology, Hoboken
McCANN, LELAND R., Designing Draftsman, American Can Co., Newark
MURPHY, WILLIAM D., Research Engineering Department, Federal Shipbuilding Co., Kearney
PITBLADDO, GRANT W., Production Engineer, Federal Shipbuilding Co., Kearney
SCHWENNESEN, HERMAN A. B., Westfield
SHIELDS, SYLVESTER J., International Motor Co., Plainfield
VAN RIPER, FRANCIS H., West Hoboken
WHEELER, FRANK I., JR., Plant Engineer, Tiffany & Co., Silver Works, Newark
YAU, CHARLES Y., Student Sales Engineer, Worthington Works, Harrison

New Mexico

THOMPSON, ROSS E., Manager, Deming Ice and Electric Co., Deming

New York

AMARI, YOSHIMASA, Engineer, The Kuhara Trading Co., New York
BURDICK, REGINALD H., Gas Engineer, Electric Bond and Share Co., New York

CASEY, Frank A., Warren-Nash Motor Corpn., New York
CHEEK, William C., Student Engineer, Worthington Pump and Machinery Corpn., Buffalo
CHRISTIE, Alvan B., J. J. Lynch Co., New York
CORLEY, John P., Sales Engineer, Ingersoll-Rand Co., New York
ELSMAN, John G., Manager, Salvage Department, United States Mail Steamship Co., New York
FEE, Harold R., Ingersoll-Rand Co., New York
FERGUSON, Louis A., Jr., Mechanical Engineer, Thompson-Starrett Co., Long Island City
FILSKOV, Alfred, Technical Assistant, Beeler Organization, New York
FISHER, Harry L., Thos. E. Murray, Inc., New York
FREEMAN, Arthur E., Mechanical Engineer, F. A. Waldron, New York
FROMBERG, David, New York
GALLMEIER, Siegmund H., Engineer, Gordon & Kaelbe, Rochester
GOUDY, Carl F., Student, Pratt Institute, Brooklyn
GREENE, Whitney E., Student Engineer, Worthington Pump and Machinery Corpn., Buffalo
HARRIS, Benjamin E., Assistant Engineer, Ford, Bacon & Davis, New York
HEINEN, Frederick C., Mechanical Engineer, Southern Pacific Co., New York
HENNESSEY, John W., Assistant to Vice-President and General Manager, Art Work Shop, Buffalo
HILBERT, Charles D., Ford, Bacon & Davis, New York
HILDUM, Charles E., Engineer, Western Electric Co., New York
KEESING, Maurice, Ford Instrument Co., New York
LORD, Charles R., Regional Manager, Allied Machinery Co. of America, New York
LOWE, John, Vice-President and Secretary, M. T. Davidson Co., New York
McDERMOTT, Eugene, Brooklyn
McDONALD, Frederick, D. McDonald & Co., Plant of American Meter Co., Inc., Albany
MOONEY, Paul P., Estimator, J. J. McCabe Co., New York
NACKE, Arnold L., Sales Engineer, Manning-Maxwell & Moore, Inc., New York
PUGA, Guilermo, Associate-Editor, McGraw Hill Co., Inc., New York
SALMONSEN, Robert, Assistant Engineer, F. L. Smidth & Co., New York
SCHWARTZ, Francis H., Ford Instrument Co., New York
SHAW, George V., Engineer, A. S. Cameron Steam Pump Works, New York
SOULE, George, Student, Pratt Institute, Brooklyn
STERLING, George R., Chief Inspector, Employers Liability Assurance Corpn., New York (Re-election)
TATNALL, Francis G., Foamite Firefoam Co., New York
THOMA, Fred F., Mechanical Engineer, Ford, Bacon & Davis, New York
VOISINET, Walter E., Worthington Pump and Machinery Co., Buffalo
WILSON, Ezekiel J., Plant Engineer, F. C. Huyck & Sons, Albany
WEIR, Milton L., Assistant Steam Engineer, Lackawanna Steel Co., Buffalo
WISNER, Isle R., Draftsman, The Bagley & Sewell Co., Watertown

Ohio

COPP, Charles F., Industrial Engineer, The Enterprise Manufacturing Co., Akron
DUNSCOMB, W. S., Twinsburg
GOUGH, Harry F., Plant Superintendent, Cincinnati Axle Division, The Standard Parts Co., Cincinnati
HAZEN, Deane S., Assistant Advertising Manager, The National Acme Co., Cleveland
HOLLAND, Frederick W., Chief Engineer, Streine Tool and Manufacturing Co., New Bremen
KMENTT, Cornel, Designer, Experimental Machinery, B. F. Goodrich Rubber Co., Akron
REISER, Irving W., Construction Engineer, Owens Bottle Co., Toledo
RUSSELL, Herbert O., Aeronautical Mechanical Engineer, Air Service, United States Army, Dayton
SAVAGE, Edwin S., Draftsman, The Cleveland Twist Drill Co., Cleveland
SMITH, H. Collier, President and General Manager, The Quickwork Co., St. Marys

Oklahoma

COULSON, Herbert M., Division Superintendent, Sinclair Oil and Gas Co., Tulsa
McKINLEY, Carl S., Chief Engineer, Osage Cotton Oil Co., Muskogee

Oregon

McDOUGALL, George F., Proprietor and Manager, G. F. McDougall Co., Portland

Pennsylvania

CALHOUN, John V., Assistant Power Superintendent, E. I. duPont de Nemours, Philadelphia
CLARKE, Herbert E., Ordnance Inspector, Bethlehem Steel Co., Bethlehem
COOPER, Michael A., Branch Manager, J. N. Knight & Son, Philadelphia
DAVIES, Henry K., Pennsylvania Salt Manufacturing Co., Philadelphia
DIETERT, Harry W., Foreman Technical Appliances, Westinghouse Electric and Manufacturing Co., Lester
FREEMAN, Arthur C., Vice-President, H. W. Butterworth & Sons Co., Philadelphia
HEMPEL, John T., Erecting Engineer, Westinghouse Electric and Manufacturing Co., Lester
JIMESON, Robert M., Test Engineer, Macbeth-Evans Glass Co., Charleroi
LOWNES, N. Thayer, Engineering Assistant, Electric Department, Philadelphia Rapid Transit Co., Philadelphia
O'NEILL, James L., Inspector in charge of Tools and Gauges, Frankford Arsenal, Philadelphia
PARKER, William P., General Manager, The Ballinger Co., Philadelphia
PRICE, Morton M., Engineer and Agent, The Babcock & Wilcox Co., Philadelphia
RUST, Henry P., Engineer of Plant, William Cramp & Sons Ship & Engine Building Co., Philadelphia
SCHUSTER, William A., Assistant Professor of Mechanical Engineering, Kansas State Manual Training Normal School, Pittsburgh
SEACHRIST, Marriot B., Linoleum Department, Armstrong Cork Co., Lancaster
SLEATH, Arthur R., Philadelphia Manager, Heald Machine Co., Philadelphia
SLOAN, William A., Instructor in Mechanical Engineering, University of Pennsylvania, Philadelphia
VELANDER, Verner R., Chief Engineer, Marion Machine Foundry and Supply Co., Scottdale
WIDAU, William E., Sales Engineer, The Elliott Co., Jeannette
YOUNGLOVE, Charles M., Field Engineer, Westinghouse Electric and Manufacturing Co., Philadelphia

Rhode Island

CAPWELL, Elmer A., Master Mechanic, Coventry Co., Anthony
WHITTAKER, Edward G., Textile Engineer, Universal Winding Co., Providence

Texas

McINTIRE, Paul, Chief Engineer, American Brew Assn., Houston
MILTON, Hugh M., Assistant Professor, Mechanical Engineering, Agricultural and Mechanical College of Texas, College Station
SCHNEITTER, Lee, Engineer, Texas Power and Light Co., Dallas

Virginia

SCHOFIELD, Frederick C., Designing Engineer, United Cigarette Machine Co., Lynchburg

Wisconsin

HILL, Ray C., Efficiency Engineer, Falls Motors Corpn., Sheboygan Falls
PESTA, Martin H., Engineer, A. O. Smith Corpn., Milwaukee
ROVE, Louis C., Draftsman, Nordberg Manufacturing Co., Milwaukee
TURCOTT, David, Machine Designer, P. B. Yates Machine Co., Beloit

Canada

BOOTH, George E., Engineering Staff, Hamilton Gear and Machine Co., Toronto, Ont.
SCOTT, William G., Plant Engineer, Northern Electric Co., Ltd., Montreal, Que.
WAY, William C., Supervisor of Surveyor Laboratory, Topographical Surveys Branch, Department of Interior, Ottawa, Ont.

China

HULL, Maynard V., Professor of Mechanical Engineering, Húnan Polytechnic Institute, Changsha, Hunan

Cuba

BARKER, Guy A., Chief Engineer, Central Teresa Sugar Co., Ceiba Hueca, Oriente

France

TAFFANEL, Jacques, Directeur des Etablissements, de le Campagnie des Forges, da Chatillon Commentry at Neuves, Maisons

South America

LOXLEY, P. G., Assistant to Superintendent, Hydraulic Department, Central Argentine Railway, Argentine Republic

West Indies

PENNING, Cornelis, J. H., Manager, Holonulu Iron Works Co., Manila, P. I.

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

New York

KLOCK, Frank B., Assistant Manager, Caustic Department, The Solvay Process Co., Syracuse

PROMOTION FROM ASSOCIATE-MEMBER

Massachusetts

BIGELOW, Carle M., Chief Engineer and Member of Firm, Cooley & Marion Co., Boston

Michigan

BERRY, Charles H., Research Engineer, The Detroit Edison Co., Detroit

New York

SCHECKENBACH, J. A. V., Assistant Chief Engineer, American Car and Foundry Co., New York
VANDEGRIFT, Wayne A., Mechanical Engineer, Turbine Engineering Department, General Electric Co., Schenectady

Pennsylvania

FARR, Arthur V., Vice-President, General Manager, Calorizing Co. of Pittsburgh, Pittsburgh

PROMOTION FROM JUNIOR

California

BALLOU, John McK., Secretary and Chief Engineer, Los Angeles Engineering and Manufacturing Co., Los Angeles
BERG, Henning J., Mechanical Engineer, Standard Oil Co. of California, San Francisco

Colorado

VIEDT, Harold B., Mines Manager, Radium Luminous Material Corpn., Naturite

Connecticut

POIRIER, Austin E., International Silver Co., Meriden

Illinois

ROYS, Lawrence, President, Western Structural Co., Moline

Indiana

WILLIAMS, Edward H., General Manager, Perkins Corpn., Mishawaka

Michigan

OWEN, Ira J., Superintendent, Bissell Carpet Sweeper Co., (Reinstatement), Grand Rapids
REID, Edward S., Vice-President and Chief Engineer, Northern Engineering Works, Detroit

New Jersey

WEINTZ, Louis J., Mill Superintendent, The New Jersey Zinc Co., Ogdensburg

New York

SCHULTE, Max J. L., Assistant Sales Manager, Green Fuel Economizer Co., Beacon
SEAMAN, Edwin H., Chief Engineer, Johnson & Higgins, New York

Pennsylvania

WHITAKER, John C., Mechanical Engineer, Philadelphia Quartz Co., Philadelphia

Texas

THOMPSON, Herbert L., Sales Engineer, Ingersoll-Rand Co., Houston

Washington

KRUEGER, George H., Chief Engineer, Anderson Draft Regulator Co., Seattle

Canada

MOODY, Frederick H., Secretary, Treasurer, Powley & Townsley, Ltd., Toronto, Ont.

Japan

GORHAM, William R., Chief Engineer, Idoshia Seizo Co., Osaka

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JUN 24 1921

In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers. Publication Office 207 Church St., Easton, Pa. Headquarters of the Society, 29 West 39th St., New York

Vol. 43, No. 6 — A.S.M.E. AFFAIRS — June, 1921

COUNCIL ENJOYS HOSPITALITY OF SOUTHERN CITIES

Full Business Program Transacted; Atlanta Decided on for 1922 Spring Meeting

The council enjoyed the courtesies of Atlanta, Birmingham, Mobile and New Orleans members of the Society on the occasion of its meeting held at Mobile on April 22. The regional meeting of the Local Sections was also held at Mobile at the same time, thus affording the southern members an excellent opportunity to meet the officers of the Society.

A full program of business was transacted. President Carman presided and there were present: Managers C. Russ Richards, F. O. Wells, Earl F. Scott, L. C. Nordmeyer, H. M. Norris and E. C. Fisher; Vice-Presidents R. M. Fernald, W. B. Gregory, L. P. Alford and John L. Harrington; Chairman of Standing Committees George A. Orrok, Publication and Papers, W.H. Kenerson, Local Sections, and J. L. Harrington, Constitution and By-Laws; Secretary, Calvin W. Rice.

Appreciation of Mr. French. The Council by resolution—printed on p. 416 of Section One—expressed its deep regret and sorrow at the loss by death of its esteemed editor of publications, Lester G. French.

Spring Meeting, 1922. Atlanta, Ga., was chosen as the place of the 1922 Spring Meeting, on the joint recommendation of the Committee on Meetings and Programs and a Committee of the Local Sections.

Remission of Dues. Under the provisions of

(Continued on page 68)

MECHANICAL ENGINEERING
For June
Delayed by Printing Situation

The July issue will carry a story of the Chicago Convention, the largest and most successful A.S.M.E. Spring Meeting Ever Held

REGIONAL MEETING STAGED AT MOBILE AND NEW ORLEANS

Sessions at Mobile Followed by Well-Organized Trips in New Orleans

The Sections Committee, preceding the Council, met with the Sections in Atlanta and Birmingham, then joined the Council and members from New Orleans, as well as from Birmingham and Atlanta for the regional meeting held in Mobile on April 22. Following the address of welcome by Mayor H. Pilans, of Mobile, simultaneous sessions were held,one being the Council meeting, the other the main meeting. Dr. W. E. Winship of New Orleans who delivered an address on Fuel Problems of the South, gave some valuable statistics as to the production and consumption of fuel oil in this and other countries and also made some interesting predictions as to the future of the oil industry. In discussion which followed, some very important points were brought out concerning the Rittman process, boiler design, and several other equally interesting subjects.

(Continued on page 68)

REPORT OF THE NOMINATING COMMITTEE

The report of the regular Nominating Committee of nominations for officers of the Society for 1922 and for delegates to the American Engineering Council of the Federated American Engineering Societies for 1922, has been received by the Secretary, and is published below in accordance with the provisions of the By-Laws:

OFFICERS OF THE SOCIETY

For President:

DEAN DEXTER S. KIMBALL, Ithaca, N. Y.

For Vice-presidents:

COL. E. A. DEEDS, Dayton, Ohio.
ROBERT SIBLEY, San Francisco, Cal.
L. E. STROTHMAN, Milwaukee, Wis.

For Managers:

SHERWOOD F JETER, Hartford, Conn.
HORACE P. LIVERSIDGE, Philadelphia, Pa.
HOLLIS P. PORTER, Tulsa, Okla.
W. S. FINLAY, JR., New York, N. Y.
(to fill unexpired term of Dean Kimball)

For Treasurer:

W. H. WILEY, New York, N. Y.
CHARLES A. BOOTH, Buffalo, N. Y.

AMERICAN ENGINEERING COUNCIL

FRANCIS BLOSSOM, New York, N. Y.
GANO DUNN, New York, N. Y.
H. H. ESSELSTYN, Detroit, Mich.
W. S. LEE, Charlotte N. C.
IRVING E. MOULTROP, Boston, Mass.
JOHN A. STEVENS, Lowell, Mass.
A. F. WALDEN, Baltimore, Md.
PERLEY F. WALKER, Lawrence, Kan.

Respectfully submitted,

(*Signed*) ELMER SMITH
B. S. HUGHES
E. O. EASTWOOD
F. E. BAUSCH
W. W. VARNEY
W. M. WHITE, *Secretary*
G. K. PARSONS, *Chairman*
Nominating Committee for 1921

TEXTILE DIVISION'S STRONG PROGRAM AT PROVIDENCE

Success Attributed to Interesting Papers, Organized Trips and Excellent Cooperation

The first meeting of the Textile Division of The American Society of Mechanical Engineers was held on April 12 at Providence, R. I., with an attendance of over 400. The Providence Engineering Society and the Providence Local Section A.S.M.E. acted as hosts, and opportunities were offered the visitors for inspecting industrial works, including the Apponaug Company and the Universal Winding Company.

Charles T. Plunkett, chairman of the Division and Past Vice-President of the Society, presided and called attention to Providence as the center of cotton, woolen, worsted and allied industries.

George W. Foster, of the Universal Winding Company, spoke on the art of winding as related to the textile industry. He explained that winding, as a preparatory process applied to weaving, saves waste in time, effort, and material. Winding machines wind filling with compact precision for mule caps, or frame bobbins on to a paper or wooden container holding two or three times the amount of yarn usually presented to a loom.

Warren B. Lewis, consulting engineer and president of the Providence Engineering Society, pointed out the economics effected by introducing electric drive in cotton-cloth-finishing plants.

Frederick J. Hoxie, in charge of the research work at the Warwick Mills, Centerville, R. I., emphasized the necessity of developing microscopy in textiles. The technical methods used at present have been borrowed from other industries and sciences, and are not directly applicable to textiles. Research work was needed and he suggested Brown University in Providence as a suitable center for this work, the exchange of ideas to be carried on in connection with the Textile Division and the Providence Local Section of the A.S.M.E.

E. H. Rooney, treasurer of Gordon-Ray Company, discussed the utilization of low-grade cotton. In the United States the total annual production of low-grade cotton amounts to from three to four million bales, the utilization of which would increase the supply of standard goods by 20 per cent, or enough to supply over 5,000,000 spindles.

The quality of the meeting is well brought out in a letter from James W. Cox, Jr., a member of the Society who attended the meeting from New York City. Mr. Cox writes:

> It was the best meeting that I ever attended, and there was more life, enthusiasm and more real enjoyment shown in that one day than I have ever before noticed in any meeting. The meeting had been carefully planned, was well run and I do not think too much praise can be given to the chairman, secretary and members of the committee of the Textile Division, to the Local Committee of the Providence Engineering Society and the

men who so kindly opened their factories to us.

I attribute the success to: Carefully prepared and interesting papers; well-organized inspection trips to interesting textile plants; the meeting held at a convenient and centrally located textile center; excellent cooperation between the local and A.S.M.E. Committees; a convenient day of the week; that it did not take a busy man more than one day away from his business; and the adoption of an excellent plan for social intercourse by having a buffet supper.

I was interested in the fact that there were so many different types of men represented, practically from every branch of the textile industry. I noticed owners, agents, superintendents, plant engineers, assistant superintendents and the younger executives of mills, construction engineers, consulting engineers, professors in technical schools, textile chemists, and members of the staffs of the leading textile papers. Besides these men directly interested in the industry, there were members of the Providence Engineering Society, and students from Brown University.

SECRETARY'S LETTER

Engineers as Promoters of International Good Will

Lord Northcliffe in addressing this month a representative group of merchants from the United States brought out the only true and permanent basis for world peace. "The misunderstandings between England and the United States" he said," can be cleared up through frankness and cooperation. There is no trouble between Great Britain and the United States, there will be no trouble in my judgment, if we can get together."

What is fundamental is the spirit of mutual understanding. What is true of Great Britain and the United States is true of all.

In the May MECHANICAL ENGINEERING we were happy to announce that the four National Engineering Societies were to send a deputation to the summer meeting of the British Institution of Civil Engineers to express our good will and appreciation. As part of the event, the John Fritz Medal will be awarded to Sir Robert Hadfield.

The deputation will consist of four Past-Presidents of this Society, Messrs. Swasey, Hollis, Main and Freeman, and also Colonel Dwight and Dr. Jewett. They collectively and officially represent all four National Engineering Societies.

Since the announcement of the proposed journey of this deputation invitations have been received from the Institution of Mechanical Engineers and the Institution of Electrical Engineers requesting that the American representatives meet also with them.

The deputation or some of its members will also go to France and carry greetings to the Société des Ingénieurs Civils de France.

The vision of our nation and our profession must now be international if we are to do our part in the world. "No entangling alliances" are necessary or even inferred. It is simply the development of understanding.

We engineers are peculiarly fitted, by virtue of our idealism and freedom from selfish motives, to develop special contacts, and the more bonds of understanding and friendship that are made, the more remote will be wars between those nations having such ties.

Our Society has always been active in interchanging visits and we should encourage them even more for the direct good that may follow.

The Secretary is actively coöperating with others in developing a Pan-American Engineering Conference at Lima, in connection with the Pan-American Scientific Congress to be held there in July of next year.

Should the idea be favorably received, it is proposed that delegates from the countries and

(Continued on page 67)

PROFESSIONAL DIVISION RULES ADOPTED BY STANDING COMMITTEE

Organization Outlined and Administrative Guidance Provided for Committees

As already announced in MECHANICAL ENGINEERING, the Standing Committee of Professional Divisions recently augmented the By-Laws of the Society governing Professional Divisions by adding such rules as were necessary to round out the organization and provide the details of administration.

Since there are now over 6,000 members registered in the Professional Divisions it is felt that a complete publication of the Rules should be made, and each member is asked to read these and familiarize himself with their provisions as set forth below.

The Professional Divisions are proving to be an excellent means of increasing the contacts in the Society, each Division appointing a number of sub-committees and enrolling an increasing proportion of the membership in the service. To date over 200 members of the Society are assigned to the various committees of the Professional Divisions, and there is plenty of room for more members to come into the new activity.

Rules for Professional Divisions

Adopted by Standing Committee on Professional Divisions

[*Note:* Paragraphs in quotation marks are quoted from the By-Laws of the Society.]

OBJECT

"The object of the Professional Divisions is to provide through organization of members who are particularly interested and others who may affiliate with them means for promoting the arts and sciences of the several branches of engineering included in the scope of the Society's activities."

"The Standing Committee on Professional Divisions shall consist of the chairmen of the various Professional Divisions of the Society. The members of the committee shall elect annually their chairman from their own number. The chairman shall have the rights and privileges accorded to the chairmen of the other standing committees of the Society."

"The function of the Committee on Professional Divisions, under the direction of the Council, as required in By-Law B-47, shall be to organize, foster and coördinate Professional Divisions and their activities."

MEMBERSHIP

"A professional division of the Society shall consist of Honorary Members, Members, Associates, Associate-Members and Juniors of The American Society of Mechanical Engineers and of other persons to be designated Affiliates as hereinafter described." (Quoted from B-47)

ADMISSION

Members. A member of any grade of the Society who shall make written application to the Secretary of the Society, is eligible to membership in a professional division of the Society.

Affiliates. "Engineers and others not members of The American Society of Mechanical Engineers, but desiring to participate in the meetings of a division may enroll themselves as Affiliates with the approval of the Executive Committee of the division. Such Affiliates shall have the privilege of presenting papers and taking part in the discussions. They shall pay ten dollars ($10) per annum, which shall be due and payable in advance on October 1 of each year of their enrollment, and shall thereby be entitled to receive the regular issues of MECHANICAL ENGINEERING for a period covered by such subscription." (Quoted from B-47)

Application to an Executive Committee of a

(Continued on page 67)

MID-CONTINENT SECTION IN ANNUAL JOINT CONGRESS

Joins With Five Other Local Sections in Engineering-Chemical Program

The Mid-Continent Section of the A.S.M.E. played an important part in the first annual joint Engineering and Chemical Congress of the Mid-Continent, held at Tulsa, Okla. April 28 and 29. Five other local sections of national societies also participated, including those of the American Chemical Society, A.S.C.E., A.I.M.E., A.I.E.E. and A.A.E. Three professional sessions were held, about 150 registered, coming from various parts of Oklahoma, Kansas, Missouri, Arkansas and Texas, and the Executive Committee of the Mid-Continent Section is entitled to a great deal of credit for its enterprise in developing this congress of engineers which proved such a success.

Thursday Sessions

Separate business meetings were held Thursday morning by the Oklahoma Chapter American Chemical Society; Oklahoma Chapter A.S.C.E.; Mid-Continent A.I.E.E.; and Mid-Continent Section A.S.M.E., with report of the Research Committee by Dean P. F. Walker, chairman. Dr. Edwin De Barr presided over the joint professional session in the afternoon. The address of welcome was made by A. L. Farmer and responded to by representatives of the various societies. The following papers were presented and discussed: Petroleum as a Source for Chemical Manufacturers, by Dr. Sidney Born, Trans-Continental Oil Co.; Power, by Dean P. F. Walker, Kansas University; Fitting the Road to the Traffic, or the Traffic to the Road, by E. S. Alderman, state highway engineer, Oklahoma City; A Study of Some Organic Reactions in Which a Gas is Evolved, by Dr. Hilton K. Jones, Oklahoma A. & M. College, Stillwater; and Kansas City's Modern Light Plant, by H. C. Blackwell, Kansas City Power & Light Co., Kansas City, Mo.

On Thursday evening a banquet was held in the club room of the Tulsa Hotel. On Friday morning automobile trips were made to the new electric power generating station of the Oklahoma Public Service Corporation, West Tulsa, and also to the Shell Creek Reservoir, inspecting the largest Amburson type concrete dam in the state of Oklahoma.

Papers on Friday

The papers presented at the professional session Friday afternoon were Modern Railway Shop Facilities, by B. P. Phelps, A.T.S.F. Ry. Topeka, Kan; Comparative Tests of Automatic Ventilators, by J. P. Calderwood and Prof. A. J. Mack, Kansas State Agricultural College, Manhattan, Kan; Milk Sold by the Case, by Dr. Edwin De Barr; Power Requirements of a Cement Plant Using the Wet Process, by C. A. Swiggett; American Methods of Electric Drilling and Operating Oil Wells, by T. D. Wilkinson, Petroleum Electric Co., Tulsa, Okla; and Commercial Considerations Involved in the Application of Conversation Measures to the Production and Handling of Crude Oil, by Chas. P. Buck, Perfection Metal Products Co., Topeka, Kan.

At the evening professional session the papers were: The Development of a County Highway System, by Dan W. Patton, county engineer, Tulsa, Okla.; Surface Tension of Petroleum, by Dr. C. K. Francis and H. T. Bennett, Cosden & Co.; Recent Developments in Concrete, by Frank B. King, Portland Cement Assn., Oklahoma City, Okla.; Tests on the Absorption of Gasoline from Casing-Head Gas by Activated Charcoal, by H. R. Auerswald, Gypsy Oil Co., Tulsa, Okla.; Oil Shales, Past, Present and Future, by Hudson F. Layton, Empire Companies, Bartlesville; and Automatic Control of Stations and Substations, by a representative of General Electric Co.

At its business meeting on Thursday morning the A.S.M.E. Mid-Continent Section voted to accept the suggestion of the St. Louis Section to hold a joint meeting at Kansas City the latter part of October of this year. All local sections and engineering societies in the territory of the Mid-Continent Section and of the St. Louis Section will take active parts in this joint fall meeting.

C. L. NEWCOMB CELEBRATES FORTIETH ANNIVERSARY

In honor of the fortieth anniversary of the day when Charles L. Newcomb, now manager of the Holyoke Deane Works of the Worthington Pump and Machinery Corporation, first became associated with the Deane Steam Pump Company, the employees on April 21 staged a noon-hour celebration in the machine-shop auditorium of the Holyoke Plant. An anniversary address was made by James J. Murray, of the engineering department of the Deane Works, who emphasized the fact that Mr. Newcomb is still "the exponent of energy of the whole shop" and "the mainspring of the organization." Henry M. Chase, engineer for the Deane Works, on behalf of the men and women of the company, presented Mr. Newcomb with a silver testimonial. Numerous congratulatory massages were read and floral gifts from members of the Deane Works, from officials and from engineering societies were presented. Winfield E. Holmes was present to represent The American Society of Mechanical Engineers, of which Mr. Newcomb is a manager, and the Engineering Society of Western Massachusetts, of which Mr. Newcomb was elected the first president.

Mr. Newcomb, in a short address, commented upon the fact that many others of the Deane Works are distinguished for long service; twenty men have been continuously on the payroll of the establishment for a period of more than thirty years.

Mr. Newcomb has taken an active part in the municipal affairs of Holyoke since 1886. In 1893 he was named chairman of the fire commission, to which he was appointed the preceding year, and he served on this commission for 17 years, during which time he invented the water tower now in use. Fire hydrants approved by the National Board of Fire Underwriters and the American Water Works Association are made to standards also developed by Mr. Newcomb during this time.

In addition to his membership and active service in The American Society of Mechanical Engineers since 1883 and in the Engineering Society of Western Massachusetts since its formation in 1919, he is president of the Holyoke Cooperative Bank and a member of various fraternal organizations and social clubs in Holyoke, New York and Boston.

SECRETARY'S LETTER

(*Continued from page 66*)

from the leading engineering societies of North and South America meet to discuss and propose engineering matters of mutual interest, such as the latest methods of water development, irrigation, elimination of waste through standardization of supplies for all purposes, and the conservation of natural resources.

Benefits are bound to accrue from such a conference to all the republics of the Western Hemisphere, not only by reason of the interchange of opinion, but also because of the closer personal contact that will be brought about between the leaders of engineering enterprises in every section of the two continents.

CALVIN W. RICE, *Secretary*

COMMITTEE ON AWARDS ASKS MEMBERS' COMMENTS

Recommends Hjalmar G. Carlson For His Notable Invention

At a meeting of the Committee on Awards and Prizes held on April 4 it was recommended that information regarding proposed awards for notable inventions be published in MECHANICAL ENGINEERING, calling the attention of the membership to the fact that the Committee on Awards and Prizes desires special comment from the members regarding proposed awards for notable inventions.

The Committee has recommended that an award be made to Hjalmar G. Carlson for his invention and part in the production of 20,000,000 Mark 111 drawn steel booster casings used principally as a component of 75-mm. high-explosive shells, but also extensively in gas shells and bombs.

Outline of Achievements

The following outline of Mr. Carlson's achievements relative to the production of these casings is given, with the request that members coöperate with the Committee by commenting upon the proposed award.

A booster consisting of a booster casing, charge of high explosive, and a fuse socket, is one of the components essential to the proper functioning of a high-explosive shell at the target. The production of boosters is dependent upon the booster casing, a component entirely new to the manufacturers of this country and even to the Ordnance Department before the war.

For many years before the war and throughout its duration the French used in their 75-mm. gun a shell having a tapered booster casing made by hot-drawing a short round billet, until the approximate shape was obtained, and then either finish-forming in process, or machining it to the exact shape.

About a year before the war Mr. Carlson invented a process of cold-drawing, without subsequent machining, the French type of booster casing from "dead soft, deep drawing" sheet steel. Soon after the United States entered the war, in a talk with the officer in charge of the design and production of artillery ammunition, he found that the French type of shell and components had been decided upon, but that the design of the booster casing had been modified by doing away with the taper on its outside because of its being too difficult to permit of manufacture in large quantities, and substituting for it a straight cylindrical surface. Furthermore, Mr. Carlson found that the Department, having been advised by competent manufacturers that even the straight-sided booster casing could not be drawn from the flat sheet, owing to its enlarged threaded end, had fully decided to machine all casings from the solid bar in automatic screw machines. The Department was prepared to pay 14 cents each for these casings so made.

Mr. Carlson convinced the officials of the Ordnance Department that their substitute design for the French type could and should be cold-drawn from flat stock rather than machined from bars in automatic screw machines, and also that the exact French tapered model could also be thus reproduced.

Method Perfected for Practical Manufacture

The Rockwood Sprinkler Company, Worcester, Mass., of which Mr. Carlson was general superintendent, contracted to make these casings for the Ordnance Department. Mr. Carlson made a series of inventions to perfect his method of manufacture and make it entirely practical and organized a new manufacturing department which made over twenty million casings. Due to the large saving in material and in plant cost and expense of operation, the Rockwood Company was able to produce the casings at a much lower price than that first estimated, delivered them several weeks ahead of the contract time of delivery, and did much in helping other government contractors to fill their contracts.

PROFESSIONAL DIVISION RULES ADOPTED BY STANDING COMMITTEE

(*Continued from page 66*)

professional division for affiliate membership in that division shall be made on an approved form. Applicant shall give a complete account of his industrial and engineering activities and agree that if accepted he will conform to the Constitution, By-Laws and Rules of the Society and the professional division to which he applies for membership. He shall refer to three (3) members to whom he is personally known.

ORGANIZATION

"A professional division of The American Society of Mechanical Engineers may, with the approval of the Council, be organized for the consideration of any engineering, scientific, or professional topic, provided that a number, satisfactory to the Council, of members of The American Society of Mechanical Engineers unite in making written request for such an organization. Such a division shall be designated as..... Division of The American Society of Mechanical Engineers, the blank being filled by the topic specialized." (Quoted from B-47)

Petitions asking for the formation of a professional division shall be presented to the Standing Committee on Professional Divisions for recommendation to the Council. Upon approval from the Council the Chairman of the Professional Divisions Committee shall appoint, a temporary Chairman for said division.

ELECTION

The initial election of the Executive Committee shall be as follows:

A Nominating Committee of three (3) members shall be appointed or elected, as prescribed by the executive committees of the various divisions.

It shall be the duty of this committee to select a ballot for the election of an executive committee of five (5) members: Three members to serve until the Annual Meeting after the next Spring Meeting of the Society; and two members to serve until the second Annual Meeting after the next Spring Meeting of the Society.

The Nominating Committee shall submit its selection to the Secretary of the Society, who will distribute ballots, register the returns, and notify the Nominating Committee of the results. The Nominating Committee shall notify the Executive Committee, who shall immediately assume complete charge of the division.

Nominating Committee. During the month of May each year there shall be appointed or elected a nominating committee of three (3) members. It shall be the duty of this committee to hand to the Secretary of the Society between June 1 and 15 the names of the candidates for two new members of the Executive Committee. The election shall otherwise be held and conducted similar to the election of the national officers of the Society.

Executive Committee. "For the convenient conduct of its professional affairs the division shall organize an Executive Committee of five (5) members of the Society, under the general direction of the Council. Such officers as the division shall require must be selected from the membership of the Society. Other committees of the division shall be appointed by its Executive Committee." (Quoted from B-47)

The Executive Committee shall elect its own officers. No one shall be eligible for chairmanship until he has been a member of this committee for one year, except in the initial election of officers, in which case the chairman shall be chosen from one of the one-year members. A chairman shall remain a member of the Executive Committee for a period of one year after serving as chairman. No one shall be eligible to serve as chairman more than two consecutive years.

Where executive committees have been elected without length of service stipulated, all excepting the chairman shall be placed on a ballot at the

first regular election after their initial election, and two of their number be elected for a term of one year, the other two members to be succeeded by the newly elected member as mentioned above.

In case of resignation or decease the vacancy is to be filled by appointment of the executive committee subject to the approval of the President of the Society.

"The executive committee of the division, subject to the approval of the Secretary of the Society, shall designate a secretary on the division of the Society whose duties shall be those usually attaching to the secretary of a professional division and who shall also see that the discussions of papers are satisfactorily reported and transmitted to the Secretary of the Society."

FINANCING

"Expenditures for the purpose of a division chargeable to the Society must be authorized by the Secretary of the Society before they are incurred, and must be provided for in the budget approved by the Council. No liability otherwise incurred shall be binding on the Society. Any expenditure not so provided for must be met by the division itself." (Quoted from B-47)

MEETINGS AND PROGRAMS

Notice of all professional division meetings shall be given in writing at least six weeks in advance of the date set for such meeting to the Secretary of the Society and the Chairman of the Standing Committee of Professional Divisions.

SOUTHERN HOSPITALITY ENJOYED BY COUNCIL

(Continued from page 65)

the By-Laws the dues of the following members were remitted, either by reason of their having paid dues for 35 years or having reached the age of 70 years and paid dues for 30 years:

E. J. ARMSTRONG	JOHN W. LIEB
S. N. BOURNE	W. G. MATHESON
E. R. BULLOCK	M. F. MOORE
ARTHUR FALKENAU	D. E. MORAN
G. L. FOWLER	WENSEL MORAVA
N. D. FRASER	F. B. PHILBRICK
H. B. GALE	FRANK RICHARDS
C. E. GILES	A. SORGE, JR.
C. O. HEGGEM	W. N. STEVENS
HARRY M. LANE	C. J. ULLMANN
J. LATTIN	J. S. UNGER
C. G. DE LAVAL	W. M. WHITNEY

Constitution and By-Laws. The Council approved amendments to the By-Laws providing for the annual election of the Society's representatives on the American Engineering Council; changing the name "Professional Section" to "Professional Division;" and providing for the convening of the Annual Meeting in New York City and adjourning to any other place upon the decision of the meeting.

Local Sections Exchange of Courtesies with the Arctic Club of Seattle was approved.

Relations of Major Activities. L. P. Alford, Chairman, W. B. Gregory, George A. Orrok, J. H. Herron, J. W. Roe, H. A. Reed and D. S. Kimball were appointed a special committee to investigate the relations between the General Meetings, Local Sections and Professional Divisions of the Society. This committee was to meet prior to the Spring Meeting and report to the Council in time for recommendations to the semi-annual business meeting in Chicago.

Research Committee. The following personnel of the Sub-Committee on Stresses due to Vibration in Shafting was announced:

N. W. AKIMOFF, *Chairman*	F. HYMENS
B. A. BEHREND	WM. H. KAVANAUGH
A. H. BEYER	WM. MCENTEE
JOHN E. BURKHARDT	E. C. NEWCOMB
F. C. CLEARY	M. W. TORBET
H. C. DICKINSON	C. P. WETHERBEE

Boiler Code. Interpretations Nos. 322, 337, 342–346 were received and ordered printed in MECHANICAL ENGINEERING as usual.

Gerald Gearon and John H. Plunkett were appointed on the Sub-Committee of the Boiler Code Committee on Miniature Boilers. N. A. Carle was appointed on the Boiler Code Committee in place of H. G. Scott, deceased. Two representatives of the American Boiler Manufacturers Association were authorized on the Sub-Committee on Rules for Inspection. James Partington was appointed on the Sub-Committee on Welding in place of S. F. Jeter, resigned.

Power Test Codes. Charles F. Frey was appointed on the Committee on Instruments and Apparatus. A Recommendation that the A.I.E.E. designate one of its technical committees to coöperate with this Committee on Instruments and Apparatus was approved.

Appraisal and Valuation. The following were approved as a special committee on Appraisal and Valuation to review the papers presented before the Society on this subject and to report and make recommendations of further papers if necessary:

H. C. ANDERSON	JOHN H. GRAY
CHARLES DAY	CHARLES PIEZ
E. O. EDGERTON	RICHARD SACHES
HALFORD ERICKSON	MAX THELAN
DAVID FRIDAY	W. J. WILGUS

Employment. On the recommendation of Vice-President Alford, chairman of the Society's delegation on the American Engineering Council, a committee of three, consisting of Past-President F. J. Miller, W. C. McLellan and Morris L. Cooke, was appointed to consider the employment activity and report back.

Committee on Technical Nomenclature. The report of this committee was received and ordered distributed for discussion at the Spring Meeting.

Appointments. Hugo Bilgram, L. C. Marburg and Charles Penrose to represent the Society at the Annual Meeting of the American Academy of Political and Social Science.

Charles Russ Richards to represent the Society at the inauguration of President Coffman of the University of Minnesota.

Vote of Thanks. The Council expressed its appreciation for the courtesies extended by the Atlanta, Birmingham and New Orleans Sections, and by the Mobile members and the Louisiana Engineering Society on the occasion of its visit to the South.

NEW BY-LAWS FOR ANNUAL ELECTION TO A. E. C.

At its meeting in Mobile the Council adopted new By-Laws to provide for the annual election of the Society delegates to American Engineering Council, the governing body of the F.A.E.S. This completes the plan announced in the May issue for electing these representatives, and in fact the regular nominating committee meeting in Chicago in the first week in May selected nominees for these new offices. These By-Laws are as follows:

By-Laws

In accordance with the By-Law of The Federated American Engineering Societies of which this Society is a member society, the Nominating Committee shall also nominate to the Secretary of the Society the names of the candidates, to serve for two years, to fill the annual vacancies in the American Engineering Council, the governing body of The Federated American Engineering Societies. These names shall be delivered to the Secretary of the Society at the same time as those of nominees for officers of the Society, shall be published in the July issue of MECHANICAL ENGINEERING, and certified to the Secretary of The Federated American Engineering Societies before August 15.

The name of the member nominated for the Presidency of the Society shall also be included in the list of nominees for American Engineering Council, and in the second year of his term on that body he shall be chairman of the delegation.

In the nomination a vice-chairman of the delegation for the year shall be designated, the Junior Past-President of the Society being the chairman for that year.

Delegates to American Engineering Council shall be elected by the same method as that provided for the election of other officers of the Society.

OTHER SLIGHT CHANGES IN BY-LAWS

At the Mobile Meeting the Council also took final action on an amendment to the By-Laws B-47 to change the term "Professional Section" to "Professional Division" so as to avoid confusion with the term "Local Section." B-44 was changed to provide for the Annual Meeting being adjourned to any other city than New York. The amendment is as follows:

The Annual Meeting shall begin in the City of New York on the first Tuesday in December when the result of the annual election of officers shall be determined, and the Annual Meeting shall continue from day to day in the City of New York or elsewhere as the Council may direct.

REGIONAL MEETING STAGED AT MOBILE AND NEW ORLEANS

(Continued from page 65)

In the afternoon the entire assembly visited the Chickasaw Shipbuilding Plant, going on board several of the ships in progress of construction and one that was completed. At a dinner given at the Battle House, Mobile, and attended by about seventy-five architects, chemists and engineers of all branches, addresses were made by members of the Council and the chairman of the Sections Committee. All then took sleepers for New Orleans, where the following morning and afternoon were devoted to an inspection of the harbor developments and the new canal between the ocean and Lake Pontchartrain. This canal, built at a cost of $20,000,000 will carry vessels of 35 ft. draft.

Under the auspices of the Louisiana Engineering Society and the Local Section of the A.S.M.E., a luncheon was served to members of the Council and Sections Committee. Addresses of welcome were delivered by the president of Tulane University, officers of the Louisiana Engineering Society New Orleans, members of the Board of Direction of the A.S.C.E. and members of the New Orleans Association of the A.S.C.E.

In the afternoon a reception was given by Major and Mrs. W. B. Gregory at the new quarters of the Newcombe School, which school on the previous visit of the Society also gave a most delightful reception.

In the evening the secretary of the New Orleans Association entertained the members of the Council and members of the A.S.C.E. at his residence. Sunday, several of the officers were obliged to return, while others left to visit different sections for further meetings; those who remained were entertained at dinner by Major and Mrs. Gregory, who again in the late afternoon served tea to the members of the A.S.C.E. en route to their conference in Houston.

On Monday morning Mr. George A. Orrok, chairman of the Publications Committee, gave an address, illustrated with lantern slides, to the students of Tulane University, and Mr. Ernest Hartford, assistant secretary of the Society, gave an address at Baton Rouge.

CLEVELAND MEETING POSTPONED

It has been deemed desirable to postpone the Regional Meeting of the Sections of the Society bordering on the Great Lakes. This meeting was to have been held on June 13 and 14, in conjunction with the annual spring meeting of the Cleveland Engineering Society. The new date is announced as October 3 and 4, and more complete details will be given in future issues of MECHANICAL ENGINEERING.

BUFFALO ENGINEERING FEDERATION PROPOSED

The first meeting of the Organizing Conference of the proposed federation of Buffalo engineering societies was held on April 19. Two representatives from the Engineering Society of Buffalo and from each local section of the National Technical Societies were present, and the St. Louis plan of organization was regarded with considerable favor. The local sections of the following six national societies are at present affiliated with the Engineering Society of Buffalo: American Chemical Society, American Institute of Architects, A.S.M.E., S.A.E., American Society for Steel Treating, and the American Electrochemical Society. With this new federation the A.S.C.E., Heating and Ventilating Engineers, and the American Association of Engineers will also be affiliated.

CINCINNATI SECTION HOLDS ENTHUSIASTIC APRIL MEETING

A very enthusiastic and well-attended meeting was held in Cincinnati on April 28, the subject of which was Gearing. W. F. Zimmerman, chief engineer of the Gould and Eberhardt Company, explained the methods of manufacture employed for the various types of gears. Slides were shown illustrating gearing itself and the methods used in tooth formation as exemplified in various types of machines. Major Earle Buckingham, of the Niles-Bement-Pond Company, who spoke on Maag gears and methods of cutting, dealt principally with the characteristics of this type of gear, beginning with the elementary principle of the involute curve, and showing why certain portions of it are much more efficient for gear-tooth profiles than others. Slides illustrating the difference between the standard involute gear teeth and the Maag teeth were shown, as well as diagrams explaining the relative rolling and sliding action of both kinds of teeth. A spirited discussion followed, bringing out many interesting points.

IMPORTANT WASHINGTON MEETING HELD IN APRIL

Conditions in the Patent Office, Patents and Inventions in Specialized Industry, and The Work of the F.A.E.S. on the Elimination of Waste in Industry were the subjects of addresses at the April meeting of the Washington Section held at the Cosmos Club, Washington, D.C., Thursday evening, April 28. The speakers were the Hon. Thomas E. Robertson, U. S. Commissioner of Patents, Major Amasa M. Holcombe, War Department representative on Munitions Patents Board, and Mr. E. E. Hunt, who is directing the work of the committee on the Elimination of Waste in Industry. Mr. Hunt, in speaking on the Elimination of Waste, pointed out that the investigation being made by the Committee is an assay rather than a survey. "In making an assay," he said, "the attempt is made to break up the material into its constituent elements and ascertain in what proportion each element exists. The engineers engaged in this investigation are working along these lines and are making an effort to determine the major factors that contribute to waste in industry, and in what proportion each influences such waste."

Recent Section Meetings

Akron. May 13. President E. S. Carman addressed the meeting.

Atlanta. May 21. Joint meeting with the local section A.I.E.E. Subject: Hydroelectric Power Plants, by C. G. Adsit, Georgia Railway & Power Co.

Baltimore. May 5. Joint meeting with the Engineer's Club of Baltimore. Frank B. Gilbreth of Montclair addressed the meeting.

May 16 Subject: Steam Condensing Plants, by Paul Bancel, Ingersoll-Rand Co., N. Y. C.

Birmingham. May 18. Annual business meeting.

Buffalo. April 26 Subject: Steam Flow, by E. G. Bailey, Cleveland, Ohio.

May 17. Election of officers. J. H. Herron of Cleveland addressed meeting.

Central Pennsylvania. May 21. Spring meeting at State College. New Duties of the Engineers, Major Miller; New Opportunities for Engineers by Dean R. L. Sackett, of Penn. State College; Elimination of Waste in Industries, by Dr. Ira N. Hollis. Inspection trip of the M.E. Laboratory and of the heat transmission work at the thermal testing plant.

Cincinnati. April 28. Methods of Gear Manufacture, by W. F. Zimmerman, chief engineer, Gould & Eberhardt Co. Maag Gears and Methods of Cutting, by Major-Earle Buckingham, Niles-Bennet Pond Co.

Cleveland. May 3. Subject: Relation of the Engineer to the Management of Corporations, by Gen. C. C. Jamieson, G. D. Goethals Co.

Columbus. May 13. In the rooms of the Columbus Engineers' Club, Southern Hotel.

Connecticut State.

Bridgeport Branch. April 21. Under the auspices of the Professional Division, Committee on Machine Shop and Management. Machine-Shop Practice, by E. A. Johnson, equipment engineer, Remington Arms Co.: Organization and Management, by Professor Rautenstrauch, of Columbia University, N.Y.

Hartford Branch. May 9. Get-together dinner at the City Club.

Meriden Branch. May 9. Subject: The Metal-Finishing Industry, Its Condition, Stagnation and Remedy, by B. H. Divine, Pres. Divine Bros. Co., Utica, N. Y.

New Haven. May 3. Subject: Oil-Burning Devices as Applied in the Industries, by Dr. W. N. Best, N. Y. Election of officers.

Waterbury. May 10. Subject: The Metal-Finishing Industry, Its Condition, Stagnation and the Remedy, by B. H. Divine. Election of officers.

Detroit. May 20. Joint meeting with the Detroit Engineering Society and the Detroit-Ann Arbor Section, A.I.E.E. Messrs. Clark and Galusha of the Dwight P. Robinson Co., N.Y.C., spoke on A Mine-Mouth Superpower Station.

Eastern New York. May 19. Subject: Synchronous Motors, by A. R. Stevenson, General Electric Co.

Indianapolis. May 6. New Thoughts in Tractor Design, by F. F. Chandler, Chandler & Taylor Co.; The Sargent Cycle on the Internal-Combustion Engine, by Charles Sargent. Moving pictures of the Story of Petroleum.

Los Angeles. April 19. H. A. Barre, executive engineer of Southern California Edison Co. spoke on the present and future hydroelectric developments to be made by his company; The Present Fuel-Situation in Southern California, by F. S. Honberger, Field Agent of Los Angeles Gas & Electric Co.; Economical Methods of Burning Coal and Oil for the Production of Power, by J. Grady Rollow, consulting engineer of the Los Angeles Gas & Electric Co.

Philadelphia. May 9. Under the auspices of the A.I.E.E. Moving pictures were shown, dealing with recent inventions and general advancement in the engineering industry.

May 20. Annual Sections Dinner. Vaudeville entertainment, several short talks and election of officers.

Rochester. April 12. Rochester Engineering Society gave a luncheon, to which they invited the local A.S.M.E. Section to hear F. G. Clapp on his Experience in China.

May 5. Joint dinner of the Professiona Engineers of Rochester at the Powers Hotel The Present Business Depression and What Can the Engineer Do About It, by Calvert Townley, Westinghouse Electric & Mfg. Co.; What the Executive Expects of the Engineer, by W. Roy McCanne, General Manager & Treasurer, Stromberg-Carlson Telephone Mfg. Co. John A. Robertson, Mgr. Camera Wks., Eastman Kodak Co. acted as toastmaster.

San Francisco. May 19. Subject: The Handling and Refining of Sugar, by George M. Rolph, California Hawaiian Sugar Co.

Toledo. April 14. Subject: Distilled Boiler-Feed Water, by George R. Lyon, of Toledo, Ohio; The Spirit of Progress, moving picture from the National Acme Co., Cleveland, Ohio.

May 19. A. J. Baker of the Willys-Overland Co. addressed the meeting.

Washington D. C. April 28. Remarks on the conditions in the Patent Office by Hon. Thomas E. Robertson, U. S. Commissioner; Patents and Inventions in Specialized Industry, by Major Amasa M. Holcombe; The Work of the Federated American Engineering Societies on the Elimination of Waste in Industry, by E. E. Hunt, Engineering Council, formerly of Herbert Hoover's Personal staff.

Student Branches

Now that the college season is drawing to a close it is interesting to note that approximately 400 meetings have been held at the 56 Student Branches of the Society established at technical colleges throughout the country.

The members of the Student Branches should be reminded at this time of the facilities of the Employment Bureau, which renders service free to members of the Society and Student Branch members. All communications regarding employment should be addressed to Mr. Walter V. Brown, Manager Employment Service, F.A.E.S., 29 West 39th Street, New York.

Following is a report of some of the recent meetings held by the Student Branches.

Alabama Polytechnic Institute. April 7, 1921. Business meeting.

University of California. April 1921. Election of officers.

Case School of Applied Science. April 14, 1921. Lieutenant-Colonel Guthrie delivered an interesting talk on "Vision".

University of Cincinnati. March 15, 1921. Preparatory Steps in Machine Design, by Mr. Neninger.

Coming Section Meetings

Atlanta. June 28. At Georgia School of Technology, Atlanta, Ga. Election of officers.

Inland Empire. (Spokane, Wash.) June 17. Joint meeting with the engineering societies of Spokane.

Mid-Continent. (Tulsa, Okla.) Weekly luncheons at Tea Cup Inn, Tulsa, every Friday noon.

Philadelphia. June 17. Outing at Howard McCall Field. Golf, Tennis and baseball.

San Francisco. Weekly, Thursday luncheons at the Engineers' Club.

Colorado State Agricultural College. March 14, 1921. Business meeting. Plans were discussed for a trip for mechanical engineers to the manufacturing companies of the state.

Cooper Union. March 19, 1921. At the first meeting of the newly organized Student Branch addresses were made by Calvin W. Rice, Secretary, and L. P. Alford, on the Professional Engineer, and What Will Be Demanded of the Engineer in the Future.

March 26, 1921. Pulverized Coal by William C. Heise.

Cornell University. April 22, 1921. Joint meeting held with other engineering societies. Mr. Francis Hodgkinson delivered an interesting address.

University of Illinois. March 4, 1921. The Vehicular Tunnel under the Hudson River, by C. M. Holland.

Iowa State College of Agriculture and Mechanical Arts. March 2, 1921. Mr. E. G. Bailey spoke on Power-Plant Operation.

University of Maine. March 2, 1921. Conservation of Water Power, by Dean H. S. Boardman.

University of Oklahoma. March, 1921. Business meeting.

Pennsylvania State College. March 2, 1921. Professor L. J. Bradford spoke on Problems Met in Airplane Construction.

Polytechnic Institute of Brooklyn. April 29, 1921. "Economics Research and the Engineer, by J. Burrous.

Rensselaer Polytechnic Institute. Alumni Reunion June 16, 17, 18, and 19.

Rutgers College. April 6, 1921. Use and Abuse of Twist Drills was illustrated with motion pictures.

Washington University. April 12, 1921. A. J. Hecker gave an address on The Reclaiming of a Plant.

University of Wisconsin. March 3, 1921. Rotary Aeroplane Motors by H. A. Phillips.

March 31, 1921. Manufacture of Carbon Electrodes, by H. K. Dean.

April 28, 1921. Fuel Oil Situation, by Howard M. Posz.

Worcester Polytechnic Institute. March 14, 1921. Professor J. H. Nelson spoke on Cranks.

Yale University. March 9, 1921. Blast Furnaces and Steel Making, by Bradley Stoughton, Secretary, American Institute of Mining & Metallurgical Engineers.

Personals

ROBERT B. PORTER has severed his connection as motor-car engineer for the American and British Mfg. Corpn. of Bridgeport, Conn. and is now on the sales force of the Sherwood Automobile Corporation, Brooklyn, N. Y.

JOHN CRAWFORD has accepted an appointment as designing engineer in the Tank, Tractor and Trailer Division of the Ordnance Department, U.S.A. He will be located at Cleveland, Ohio. He was formerly with The Wellman-Seaver-Morgan Company, Cleveland, Ohio.

JOHN M. HARTMAN has resigned his position with the Aluminum Company of America to take up work in the engineering department of the Kewanee Boiler Company, Kewanee, Ill.

CHARLES LOEBER, formerly resident engineer for Francisco & Jacobus of New York and Chicago, has accepted a position as chief engineer with R. M. Anderson & Co., engineers and contractors of Richmond, Va.

JOSEPH P. TOWSON, formerly with the Bethlehem Shipbuilding Corporation at Sparrows Point, Md., is now in the engineering department of The Bartlett-Hayward Company, Baltimore, Md.

Since its organization in December C. WHITNEY CROSBY has been connected with the Automatic Signal Company of St. Paul, Minn. as production engineer, while continuing to serve as mechanical engineer for the Motor Efficiency Company and the Mutual Automobile Assn., Inc., all of which are under the same management.

ROBERT R. KEITH, who has been engaged in special design and manufacturing development work, has accepted a position with the International Harvester Company, as superintendent of the Chicago Tractor Works.

JOHN A. BAKER, formerly connected with the Mesta Machine Company of Pittsburgh, Pa., as assistant general superintendent, has been appointed works manager for the Los Angeles plant of the Rich Steel Products Company.

GEORGE L. HURST, who resigned his position with the Bethlehem Shipbuilding Corporation early this year, has opened a consulting engineering office in San Francisco, Cal., specializing in dredging and hydraulic engineering.

J. W. CHADWICK and LOUIS BENDIT have formed a partnership with offices in Kansas City, Mo., for the purpose of carrying on the practice of consulting engineering, specializing in gas and oil industry. Mr. Chadwick was formerly vice-president of the Athletic Mining & Smelting Co., Fort Smith, Ark., and Mr. Bendit was secretary for the T. B. Gasoline Co. and director of the Oklahoma Petroleum & Gasoline Co., Tulsa, Okla.

PRESTON M. SMITH, formerly import and export trade promoter for Circulo Ecuestre, Barcelona, Spain, is now with The Manthey-Zorn Laboratories Company, Cleveland, Ohio.

JOHN B. PURVES is now with the Port Arthur Shipbuilding Company, Ltd., Port Arthur, Ontario, Canada. He was formerly mill manager for the Interlake Pulp & Paper Co., Appleton, Wis.

H. B. MACFARLAND has resigned his position as engineer of tests for the Atchison, Topeka & Santa Fe Ry. Co., and is now engaged in work as consulting engineer, Chicago, Ill.

M. R. BUCHANAN has accepted a position as chief engineer for Spears & Miller Ice Company El Paso, Tex. He has resigned as manager of the Silver City Power Company but will continue to act as consulting engineer for that company.

GORDON LEFEBVRE, associated with the Chevrolet Motor Company, has been transferred from Tarrytown, N. Y. to Detroit, Mich.

GEORGE W. RIENKS, formerly with the Amalgamated Sugar Company, Ogden, Utah, is now with The Great Western Sugar Company, Denver, Colo.

CHARLES W. SEABROOK, recently member of the firm and chief engineer of the H. M. Lane Company, Detroit, Mich., is now associated with E. H. Owen, formerly superintendent of construction and chief draftsman of the H. M. Lane Company, under the firm name of Owen & Seabrook, industrial engineers, with offices in Detroit, Mich.

ARTHUR BIELEK, formerly instructor in mechanical drawing at the University of Maryland, College Park, Md., is now experimental engineer for Warren Webster & Co., Camden, N. J.

IVAR LUNDGAARD is now with the Automatic Refrigerating Company, Hartford, Conn. He was formerly with the Rochester Gas and Electric Corporation, Rochester, N. Y.

W. H. RASTALL, trade commissioner, United States Department of Commerce, after nearly three years spent in the Far East investigating the markets for American industrial machinery, has returned to this country.

ARTHUR H. KOHLBUSCH has resigned his position as construction superintendent at the Power Station of the Public Service Electric Company, Newark, N. J., and has become associated with Payne Dean, Limited, engineers and contractors for electric valve-control equipment, New York, N. Y.

ERNEST R. LESAGE, formerly assistant chief engineer for Charles B. Foster & Co., Worcester, Mass., is now associated with The G.F.H. Corporation, Denver, Colo.

H. I. LEWIS has resigned his position with the Bishop & Babcock Co. of Cleveland, Ohio, to become associated with E. A. Burrows, Chicago, Ill., doing general consulting and refrigerating engineering. He is also chief engineer for the Illinois Montague Iron Works of Chicago.

RAYMOND C. FULLER is now in the engineering department of the Sperry Gyroscope Company Brooklyn, N. Y. He was formerly with the Federal Shipbuilding Company, Kearny, N. J.

CHARLES B. RICHARDSON, formerly associated with E. Tude & Co., Bahia, Brazil, S.A., is now with the Americal Cotton Oil Company, Trenton, Tenn.

HARRY M. PERRY has resigned his position as secretary and chief engineer of the National Compressed Air Machinery Company of Los Angeles, to become Los Angeles local manager of the newly established Western Division of the Union Steam Pump Sales Company.

W. F. VERNER, formerly mechanical engineer for the Ford Motor Company, is a member of the recently formed firm of Verner, Wilhelm and Molby, architects and engineers, Detroit, Mich.

J. R. BIBBINS, formerly supervising engineer for The Arnold Company, Chicago, has taken up the direction of the new Department of Transportation and Communication in Washington. This is a department of the U. S. Chamber of Commerce.

ROBERT PALM is now in the export department of The Texas Company. He was formerly chief engineer with Chrome Steel Works, Chrome, N. J.

CHARLES F. EVELETH, recently located in the Cleveland office of Clark, MacMullen & Riley, consulting engineers, is at present with the Warren Webster Company, Camden, N. J.

WALTER C. LANGE, until recently in the New York office of the Uehling Instrument Company, has been appointed manager of the Chicago office.

Necrology[1]

GEORGE BARCLAY MERING, industrial engineer of Indianapolis, Ind., and mechanical engineer of the American Hominy Co., also of that city, died on February 20, 1921. Mr. Mering was born in Cincinnati, Ohio, in July 1864. He was graduated from Rose Polytechnic Institute in 1887, and later received his M.S. from the same institution. He became a member of the Society in 1913. He was also a member of the Chamber of Commerce of Indianapolis.

WILLIAM J. LOGAN, until his retirement in 1914 head of the Logan Iron Works, Brooklyn, N. Y., died on December 15, 1920. Mr. Logan was born in New York City on April 21, 1853. He was a graduate of Cooper Union. He was widely known for his skill and ability in the fabrication of steel and as a mathematical genius. He became a life member of the Society in 1880. He belonged also to many clubs of a social character.

JACOB B. MCKENNAN, vice-president and general manager of the Colorado Fuel & Iron Co., Denver, Col., died on March 7, 1921. Mr. McKennan was born in Pittsburgh, Pa., on January 31, 1871. He became connected with the Colorado company in 1894 and in his twenty-seven years of service advanced from the position of draftsman to that of vice-president. He became a junior member of the Society in 1899. He was also a member of a number of clubs in Denver.

GEORGE A. O'ROURKE, chief engineer of the New York State Industrial Commission, Albany, N. Y., died in that city on April 24, 1921. Mr. O'Rourke was born in New York City on July 7, 1870. He was educated in the public schools of New York and in Cooper Union and was graduated from New York City College. During the War Mr. O'Rourke was given a leave of absence from duty and he served in the Ordnance Department of the U. S. Army with the rank of Major, rendering valuable service. He became a member of the Society in 1918.

[1] For details of the professional careers of deceased members see necrology section of the forthcoming issue of the Transactions of the Society.

New Members of the Society

The following is a list of those who have qualified for membership in the Society between the dates of March 26 and April 30, 1921. The grade is indicated by the symbol after the name; i. e., M-Member; A-Associate; AM-Associate-Member; J-Junior.

ABELL, Ross Adams—J, New York, N. Y.
ABRAHAM, Howard—J, New York, N. Y.
ADAMS, Samuel T.—J, Atlanta, Ga.
AIRSTON, Alex J.—M, Lester, Pa.
AITKEN, Samuel—AM, New York, N. Y.
ALLEN, Howard L.—AM, New York, N. Y.
ALLEN, J. Wallace—M, Clairton, Pa.
ASBURY, Abner D. Jr.—J, Greenville, S. C.
ASH, Prentice D.—J, Brooklyn, N. Y.
ASHENDEN, Ernest W.—M, Minneapolis, Minn.
AULT, E. Stanley—J, Ithaca, N. Y.
AVERY, Albert R.—J, Stockton, Cal
BACON, Lewis F.—M, East St. Louis, Ill.
BAIRD, Dudley—M, San Francisco, Cal.
BAKER, George Clinton—AM, Bayonne, N. J.
BARKER, Horace C.—J, Toledo, Ohio
BARRETT, William E.—M, New York, N. Y.
BARSTOW, Ralph—A, Greenfield, Mass.
BARTLEY, Francis E.—A, Cambridge, Mass.
BATEMAN, Geo. F.—M, New York, N. Y.
BEAUMONT, Robert H.—M, Philadelphia, Pa.
BECK, Milton—M, Chicago, Ill.
BELKNAP, Harry I.—J, Akron, Ohio
BELLMAN, Russell S.—J, Greensburg, Pa.
BENNISON, W. T.—AM, New York, N. Y.
BEVAN, Thomas D.—AM, Jersey City, N. J.
BEZANSON, Claude E.—M, Syracuse, N. Y.
BIRCH, Herbert E.—AM, Philadelphia, Pa.
BLEAU, Arthur A.—AM, Chicago, Ill.
BLODGETT, Albert G.—J, Waterbury, Conn.
BLOM, Aage G.—J, Charleroi, Pa.
BOLLINGER, George R.—AM, Philadelphia, Pa.
BORG, Elmer H.—AM, Des Moines, Ia.
BRADLEY, Harry E.—AM, Milwaukee, Wis.
BRADY, James P.—A, New York, N. Y.
BRETZFELDER, Morris F.—AM, New York, N. Y.
BRINGHURST, G. Kendrick—AM, Philadelphia, Pa.
BROWN, Carl D.—AM, Hopedale, Mass.
BROW, Ernest L.—AM, Detroit, Mich.
BROWN, Gregory—M, Worcester, Mass.
BROWN, Louis P.—AM, Chicago, Ill
BROWNLIE, David—M, Cheetham, Manchester, Eng.
BRUNNER, Clarence H.AM, New York, N. Y.
BULKLEY, Leavitt J.—J, Detroit, Mich.
BURNAP, Arkell—AM, Amsterdam, N. Y.
BURNISH, Howard J.—M, Cudahy, Wis.
CAMPBELL, L. Barrett—M, Waterbury, Conn.
CAMPBELL, Robert D.—AM, New York, N. Y.
CARLZ, Joseph F.—AM, E. Cambridge, Mass.
CARROLL, James B.—J, Massena, N. Y.
CARROLL, John S.—AM, New York, N. Y.
CARTWRIGHT, Ralph A.—J, Hartford, Conn.
CERES, Robert R.—J, Arlington, N. J.
CHAMBERS, William R.—M, Chicago, Ill.
CHASE, L. G.—M, Philadelphia, Pa.
CHAVE, Walter E.—M, New York, N. Y.
CHEYNEY, Charles C.—AM, Chicago, Ill.
CLEVETTE, Charles F.—J, Watertown, Mass.
COLE, Amos G.—M, Burnham, Pa.
COLLINS, Fred T.—J, Hartwell, Cincinnati, Ohio
CONDIT, Kenneth H.—AM, New York, N. Y.
CONLEY, William Joseph—J, Rochester, N. Y.
CONROY, Thomas M.—M, London, Eng.
COVELL, Harold S.—J, New Britain, Conn.
COWAN, Bohart P.—J, Rogers, Ark.
COWAN, Frank—M, Perry, Iowa.
COX, Harry A.—M, Brooklyn, N. Y.
CRAIG, Ollison—M, Detroit, Mich.
CRANE, Harold C.—J, Toronto, Ont. Can.
CROCKER, Sabin—AM, Detroit, Mich.
CROCKETT, Winthrop M.—J, New York, N. Y.
CROWLEY, Guy Frederick—AM, Camden, N. J.
CRYSTER, Chas. A.—AM, Manilla, P. I.
CURL, William T. W.—A, Los Angeles, Cal.
CURTIS, Philip N.—M, Worcester, Mass.
DANA, George F.—M, Cincinnati, Ohio
DANEHY, T. F. Jr.—J, Cambridge, Mass.
DAVIS, A. G.—AM, Stuttgart, Ark.
DAVIS, John—AM, Hartford, Conn.
DEAN, William E. Jr.—AM, Wilmerding, Pa.
DEIKE, George H.—M, Pittsburgh, Pa.
DEMANT, H. W.—J, West Orange, N. J.
DEMPSEY, Harry P.—AM, Buffalo, N. Y.
DENLEY, Alfred N.—M, Boston, Mass.
DeQUASIE, Glenn—AM, Habana, Cuba
DeVRIES, John—M, Passaic, N. J.
DOANE, Alfred O.—M, Boston, Mass.
DOWNS, Harry N.—AM, Shelton, Conn.
DRAESEKE, Alfred W.—AM, Dundas, Ont. Can.
DUCKWORTH, Richard H.—J, Brooklyn, N. Y.
DUDLEY, William L.—M, Seattle, Wash.
DUPERU, Alphonse M.—M, Crockett, Cal.
DURAND, William L.—M, New York, N. Y.
EASTMAN, Merle W.—AM, Boston, Mass.
EATON, Lewis H.—J, Buffalo, N. Y.
ECKSTEIN, George F.—AM, St. Louis, Mo.
EELLS, Henry B. Jr.—J, New York, N. Y.
ELL, Carl S.—M, Boston 17, Mass.
ELLIOTT, Glenn C.—AM, New York, N. Y.
ELLISON, Stanley H.—J, New York, N. Y.
ELWELL, G. Randolph—AM, N. S. Pittsburgh, Pa.
EWERT, William A.—J, Chicago, Ill.
FILES, William R.—M, Providence, R. I.
FISHER, DeWitt—J, Nicholas, Fla.
FITTZ, Raymond U.—J, Medford, Mass
FITZPATRICK, J. M.—A, Spokane, Wash.
FOGG, Harry H.—AM, Boston, Mass.
FOLTZ, R. D.—J, New York, N. Y.
FORD, Harry S.—AM, New York, N. Y.
FORSCHNER, Alfred J.—AM, Buffalo, N. Y.
FOSTER, John M.—M, West Raleigh, N. C.
FOWLER, Otis L.—J, Brooklyn, N. Y.
FRANCE, A. Warren—M, Philadelphia, Pa.
FRINGER, D. L. Barlett,—J, Chester, Pa.
FUJIMURA, Senichi—J, Somerville, Mass.
FULLER, Joseph C.—AM, Bloomfield, N. J.
GALEAZZI, Roberto—M, Genoa, Italy.
GARDNER, S. Franklin—M, Washington, D. C.
GENOVAR, Harry F.—A, Tucson, Ariz.
GERMAN, Abraham J.—M, Waterbury, Conn
GIBBS, Charles R.—AM, Carthage, N. Y.
GILL, Charles A.—M, Baltimore, Md.
GILBERT, Charles T.—M, Saginaw, Mich.
GILMAN, Edward T.—M, Lowell, Mass.
GILLESPIE, John Y.—AM, New York, N. Y.
GLEN, Hugh—AM, Crystal, Mo.
GOODWIN, Ernest G.—M, New York, N. H.
GOTO, Kanezo—M, New York, N. Y.
GOULDEN, Joseph M.—J, New York, N. Y.
GREENE, Ralph L.—A, Attleboro, Mass.
GREENWELL, Nevil—M, Bethlehem, Pa.
GRIFFITH, Clement P.—M, Fort Wayne, Ind.
GRIMMER, Austin S.—AM, Brooklyn, N. Y.
GRISWOLD, George D.—AM, Ambridge, Pa.
GROSSENBACHER, Ernest—AM, Fajardo, P. R.
GUEST, Arthur B.—J, Madison, Wis.
GUIGOU, Marc A. P.—M, New York, N. Y
HADLEY, Stanton A.—M, Kansas City, Mo.
HALE, Frank B.—AM, Cleveland, O.
HALPERN, Benj. M.—AM, New York, N. Y.
HALYBURTON, John L.—M, Berwick, Pa.
HAMBLET, George W.—M, Lawrence, Mass.
HANSON, Kai Emil—J, Detroit, Mich.
HARDIN, Frank H.—M, New York, N. Y.
HARRIS, Elmer M.—AM, Los Angeles, Cal.
HARLOW, Ray L.—J, Brooklyn, N. Y.
HARTMAN, E. E.—AM, Sugar Creek, Mo.
HARTMAN, William—AM, Dayton, Ohio.
HASTINGS, Charles F.—M, Lynn, Mass.
HAWKINS, Mason I.—AM, Philadelphia, Pa.
HEARNS, Lewis M.—M, New York, N. Y.
HECKER, Arthur E.—AM, Washington, D. C.
HEIDENGER, Henry W.—M, Terre Haute, Ind.
HENDRICKSON, Niels E.—AM, Toledo, Ohio.
HEPBURN, William G.—AM, Pittsburgh, Pa.
HETHERINGTON, Carl F.—AM, Indianapolis, Ind.
HILLS, John H.—M, Philadelphia, Pa.
HINES, Frank T.—M, New York, N. Y.
HOOK, Warren H.—M, Ithaca, N. Y.
HORN, Silas H.—AM, Toledo, Ohio
HORNER, Oliver A.—AM, New York, N. Y
HOTALING, Leland—AM, New York, N. Y.
HOURWICH, Iskander—J, McCook Field, Dayton, Ohio
HOUSTON, Albert J. R.—J, Palo Alto, Cal.
HOWARD, Robert V.—M, Milwaukee, Wis.
HOWELL, Charles M.—J, Swarthmore, Pa.
HOWES, R. V.—M, New York, N. Y.
HUBBARD, Louis DeK.—A, Shelton, Conn.
HUDA, Rudolph E.—J, New York, N. Y.
HULL, Arthur A.—AM, Brooklyn, N. Y.
HUMPTON, John R.—AM, Parkesburg, Pa.
IHRMARK, Gideon—M, Phillipsburg, N. J.
ILLINGWORTH, George—AM, Goodyear, Conn.
ISLES, Frederick W.—AM, Philadelphia, Pa.
JACOB, Louis C.—J, New York, N. Y
JANKURA, Michael, Jr.—J, Bridgeport, Conn.
JEFFERY, Edward A.—J, E. Cambridge, Mass.
JEUDE, Adolph J.—J, St. Louis, Mo.
JOHNSON, Alfred—M, Toledo, Ohio
JOHNSON, Clarence N.—M, Boston, Mass.
JOHNSON, Fred E.—AM, Elizabethport, N. J.
JOHNSON, Melville L.—AM, Oklahoma City, Okla.
JONES, Robert M.—J, Newton Upper Falls, Mass.
JOHNSTON, Clarence L.—M, Oakland, Cal.
JONES, Wesley T.—AM, New Haven, Conn.
JORDAN, Harry W.—M, Syracuse, N. Y.
JORGENSEN, Hans F.—M, Brooklyn, N. Y.
KALTWASSER, Carl M.—M, Jamestown, N. Y.
KANZ, John E.—J, Boston, Mass.
KEENER, Glenn G.—AM, Bedford, Ohio
KEIM, Byron L.—J, Pittsburgh, Pa.
KENT, Roscoe—AM, New York, N. Y.
KLEINERT, Ralph B.—M, New York, N. Y.
KNAPP, Robert T.—J, Los Angeles, Cal.
KNOX, Stuart K.—M, New York, N. Y.
KNUDSEN, Knud V.—M, New York, N. Y.
KOCH, Bruno F.—AM, Butte, Mont.
KOHL, Frank E. Jr.—J, Somerville, N. J
KRADOLFER, Alfred—AM, Reading, Pa.
KRAMPE, Hugo J.—J, Cincinnati, Ohio
KRING, Shelby L.—AM, Cleveland, Ohio
KUMMING, Emil—AM, St. Louis, Mo.
KURTZE, Newton R.—J, W. Orange, N. J.
LAMCOOL, Karl J.—AM, Lafayette, Ind.
LAMONT, Robert—AM, Atlanta, Ga.
LAMPROS, George—J, Chickasaw, Ala.
LANDES, Bates E.—J, DesMoines, Iowa.
LANGE, Richard—J, New York, N. Y.
LAPPIN, Joseph—J, New York, N. Y.
LAROCCA, Carl J.—J, Brooklyn, N. Y.
LEACH, Hal W.—J, Joliet, Ill.
LEATHERS, Harry R.—J, Lester, Pa.
LEE, Fairman B.—J, S. Seattle, Wash.
LEE, Marshall B.—J, Lowell, Mass.
LEFFINGWELL, William H.—A, New York, N. Y.
LEIBMAN, Edwin A.—J, Brooklyn, N. Y.
LISSON, Reuben—J, New York, N. Y.
LOHREN, John C.—M, Nazareth, Pa.
LOWENSTAM, Benj. G.—AM, Boston, Mass.
LUCKENBACH, J. Lewis—AM, Haddon Heights, N. J.
LUDLOW, G. Richard—M, New York, N. Y.
LYNCH, Francis T.—AM, New Britain, Conn.
LYNES, H. E.—AM, Chicago, Ill.
McCARTY, Richard J. Jr.—AM, Albany, N. Y.
McCLURE, B. Carl—M, New York, N. Y.

MacDONALD, James—J, Aberdeen, Miss.
McDONALD, James F.—AM, Chicago, Ill.
McLEAN, Crandell D.—J, Hopewell, Va.
McNULTY, Dwight L.—J, Rutherford, N. J.
MADDEN, Louis J.—AM, Syracuse, N. Y.
MAGLATHLIN, Sidney A.—AM, Needham Heights, Mass.
MALBY, Seth G.—M, Ansonia, Conn.
MANNING, James G.—J, New Brunswick, N. J.
MANNING, Vannoy H.—M, New York, N. Y.
MARKS, Ward G.—J, New Haven, Conn.
MARSHALL, Albert T.—M, Hartford, Conn.
MASTENBROOK, H. J.—M, Cleveland, Ohio
MAXWELL, Robert C.—M, Lebanon, Ohio
MAYER, Joseph—M, New York, N. Y.
MAYOTT, Clarence W.—M, Hartford, Conn.
MENZL, Leon—AM, New York, N. Y.
MERKEL, Arthur W.—M, Atlanta, Ga.
MERTZ, Gordon J.—J, Bethlehem, Pa.
MEYER, Henry C. E.—M, New York, N. Y.
MICHELSEN, Donald S.—M, Worcester, Mass.
MILBURN, Richard P.—J, New York, N. Y.
MILEHAN, Raymond S.—J, Greenfield, Mass.
MILLER, Robin L.—J, Marion, Ohio
MITCHELL, William E.—M, Birmingham, Ala.
MITERMILTER, A. S.—M, Cleveland, Ohio
MOGENSEN, M. J.—J, New Haven, Conn.
MONK, Marvin E.—AM, Niagara Falls, N. Y.
MONTGOMERY, Richard B.—J, New York, N. Y.
MOORE, James G.—AM, Cincinnati, O.
MORELAND, G. F.—AM, Los Angeles, Cal.
MORGAN, Alex W.—M, Elyria, Ohio
MORSE, John G.—M, Boston, Mass.
MOY-DING, William—J, Lynn, Mass.
MUDGE, Royal B.—AM, Jackson, Mich.
MUELLER, Robert H.—AM, Decatur, Ill.
MURAYAMA, S.—AM, Ohumtashi Fukuokaken, Japan.
MURRAY, Gilbert H.—AM, Anderson, Ind.
MYERS, Robert D.—AM, Brooklyn, N. Y.
NAYLOR, James W.—AM, Niagara Falls, N. Y.
NEWMAN, Ernest W.—M, New York, N. Y.
NORRIS, John Alexander—M, Austin, Tex.
NULSEN, Marvin E.—AM, N. Canton, Ohio
O'BRIEN, Eugene W.—J, Providence, R. I.
O'HARA, Eliot—AM, Waltham 54, Mass.
OLLER, Richard H.—J, New York, N. Y.
OSEAN, Charles—AM, Woodcliff, N. J.
PARKER, Braman C.—AM, Los Angeles, Cal.
PARLETT, Raymond C.—J, New York, N. Y.
PEACHEY, James A.—J, E. Cambridge, Mass.
PEASE, Robert M.—AM, Los Angeles, Cal.
PEASLEE, Willis D.—AM, Huntington, W. Va.
PETTYJOHN, C. R.—J, Lynchburg, Va.
PHILIPS, Ran L.—AM, Gulfport, Miss.
PIEBES, Charles H.—J, Cleveland, Ohio
PODOLOFF, Nathan—J, New York, N. Y.
POGUE, Joseph E.—M, New York, N. Y.
PORTER, Wallace B.—J, Williamsport, Pa.
PRICE, Floyd U.—AM, Detroit, Mich.
PRINGLE, Joseph G.—J, New York, N. Y.
PROCTOR, Howard E.—J, Portsmouth, N. H.
QUICK, Glen W.—AM, Lansing, Mich.
RAPHAEL, Reginald—AM, New Haven, Conn.

(To be continued in July)

EMPLOYMENT SERVICE BULLETIN

Conducted by the Employment Service of The Federated American Engineering Societies,
29 West 39th St., New York

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers: non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

INSTRUCTOR for mechanical engineering drawing with experience on cams and gears. For evening work. Work starts September 1921. Location New York. X-377.

RECENT GRADUATE who has worked in rubber laboratory or has knowledge of method of handling rubber. Location New York City. X-380.

MANAGER OF INDUSTRIAL RELATIONS with experience in directing employee representation plans. Calls for man of mature judgment and definite experience. No mere theorist would be acceptable. Experience with the Leitch plan of industrial democracy essential. Application by letter only. X-396.

PROFESSOR to take charge of mechanical engineering department and build it up. Must be technical graduate with successful practical and teaching experience in positions of importance. Position open September 1921. Location Idaho. X-400.

YOUNG ENGINEER with some experience in planning and production. One with natural ability to get coöperation from those in department and get satisfactory results out of up-to-date system for scheduling orders and routing production. Previous experience in gearing desirable. Salary basis. Location Mass. X-415.

ENGINEER to develop sales and to handle advertising matters. Should have ability to write business-getting letter. Previous experience in gear-field desirable. Salary and commission. Location Mass. X-416.

ASSISTANT PROFESSOR IN MECHANICAL ENGINEERING. Broad technical training and some experience in teaching as well as engineering practice desired. Should be capable of teaching subjects ordinarily required in course in mechanical engineering such as power development with steam engines, turbines, or gas engines, power-plant design, or engineering laboratory practice such as is given in mechanical engineering courses. Location North West. Application by letter. Give careful and authentic record of training and experience together with references and photograph. X-450.

INSTRUCTOR IN MECHANICAL ENGINEERING; with experience in gas engines preferred, desirable that applicant have some teaching experience although not absolutely necessary provided record of training and engineering experience is satisfactory. Give careful and authentic record of training and experience together with references and photograph. Location N. West. X-451.

REPRESENTATIVE well acquainted with power-plant trade in Chicago, Ill. One with experience Stoker equipment and who will consider taking on our account, either in connection with other similar apparatus, or by itself; commission basis and drawing account. X-453.

ASSISTANT PROFESSOR of M. E. for Southern University of national reputation in large and progressive city to teach drawing and machine design and possibly experimental engineering and mechanics. Give training and experience in first letter. X-456.

SALESMEN to sell building proposition as side line. Men travelling in New England, Middle West, Middle Atlantic States and the South with steady position and clientel preferred. Men selling in New York City also considered. Write for appointment. Salary—Commission basis. X-457.

THREE DISTRICT MANAGERS wanted by established Ohio manufacturer of small commercial-refrigerating machinery. Should have experience and training as a refrigeration sales engineer. Graduate engineer preferred. Duties will consist of making dealer connections and keeping them "Sold." Opportunity unlimited to represent high-grade organization, marketing well-known, nationally advertised machine. Applicant must possess tact, enthusiasm and personality. No investment required—we want your ability and experience. State age, education, experience and compensation expected. X-464.

ENGINEER with broad experience in paints and varnish for sales adjustment work. Location New York City. X-465.

INSTRUCTOR in mechanical-engineering department southern engineering college; young man, preferably unmarried. Should have machine-shop and some teaching experience. Will have about 8 hours per week recitation work in elementary engines and boilers, applied mechanics, and strength of materials, and afternoon work in charge of machine-shop classes. Location South. X-470.

SALES ENGINEERS in Western New York, Western Pennsylvania, West Virginia and Ohio, to handle several lines of conveying machinery and power-plant equipment on commission basis. Proposition does not necessarily require entire time, and exclusive territory will be arranged in accordance with ability to cover. X-520.

MECHANICAL ENGINEER with practical shop experience, especially in light die work. To take charge of small specialty factory with possibility of rapid enlargement and to act as assistant to manager. State age, experience and salary expected. Location New Jersey. X-477.

MECHANICAL ENGINEER: Young man single, for work in tropics, under direction of competent managing engineer, in enterprise established over thirty years. Prefer man having two or three years student courses in Westinghouse or General Electric. Work embraces simple building operations, road construction, operation steam and electric generating plants, drafting, designing plant changes and improvements and simple survey work. Three year contract. Liberal vacation allowance, free medical attendance, board and quarters. Excellent opportunity advancement if ability demonstrated. Submit full statement training, experience and character reference. X-570.

MEN AVAILABLE

The large number of requests to insert notices under this heading make it necessary hereafter to limit the number of words in each notice to 20 so that as many members as possible may be accommodated.

MECHANICAL ENGINEER, technical graduate; 11 years designer assistant engineer, chief draftsman, mill machinery, automotive work: teacher experimental and mechanical engineering. Desires position chief draftsman, asistant engineer. SM-6303.

ENGINEER EXECUTIVE, age 34; experience civil and mechanical engineering, and business. Available immediately for export, domestic sales, or production organization; Pacific coast or Eastern section. Salary $3600. SM-6304.

ENGINEER EXECUTIVE. Age 38; 20 years' experience, practical and technical training, all kinds production planning and maintenance; familiar with design small tools and equipment; expert modern screw-machine practice; position where executive ability and resourcefulness are required. References. Salary $3500. SM-6305.

MECHANICAL ENGINEER and plant superintendent. Technical graduate; age 31; 8 years' experience power-plant equipment, maintenance and operation. Desires connection progressive concern. SM-6306.

MECHANICAL DRAFTSMAN. Technical training, 10 years' experience in structural and mechanical designing, mining, milling, smelting, railroad shops, locomotives, cars, cranes and steam shovels. Age 29; married. References; available immediately. SM-6307.

MECHANICAL ENGINEER, age 34; married, wants position as factory engineer; 12 years' experience tool making, designing, cost and production records, inspection, routing and factory layouts. Available immediately. SM-6308.

DRAFTSMAN experienced in design sulphuric-acid systems, power plants and mill buildings; also estimating and inspection. SM-6309.

MECHANICAL AND EXPERIMENTAL ENGINEER, technical graduate; age 32; married; experienced power-plant, machine shop, design, installation and maintenance of heavy cement mill and pulverized coal-burning machinery, testing, experimental and development work, can handle men and produce results. Central or Western states. SM-6310.

MECHANICAL ENGINEER, technical graduate; married; 8 years' experience machine-shop foreman charge of production, maintenance shop superintendent, machine-tool salesman; desires permanent position preferably in engineering end, with progressive concern where energy will assure promotion. SM-6311.

MECHANICAL ENGINEER experienced design, shop, drawing-room management, construction, maintenance, and organization with large Eastern steel and industrial corporations desires to connect with company in West; preferably Southern California. SM-6312.

MECHANICAL AND POWER ENGINEER, age 29; single; B. S. and M. E. 7 years' experience chemical manufacturing, machine shop, metallurgy, sugar engineering, industrial and power-plant practice, operation, layout, design, calculations, steam heating, research, etc; business and executive ability; can handle men. Desires connection mechanical engineer, works engineer or similar responsible position. SM-6313.

INDUSTRIAL OR SAFETY ENGINEER, preferably textile concern; age 28; married; experienced machinery layout, design, building construction, equipment, and power-house problems. Will go anywhere; Philadelphia preferred. SM-6314.

YOUNG ENGINEER age 23; graduate B. P. I. Lehigh (M. E.), record of effective work shop, drafting room, field, office and sales together with scholastic and student activity; seeking opportunity associating with progressive men. SM-6315.

PLANT AND CONSTRUCTION ENGINEER, age 33; technical graduate; 5 years' electrical construction including power house, transmission line and substation; 4 in mechanical and plant construction; 2 steam plant operating and testing. Prefer position plant engineer, manager or assistant manager. Excellent references. Now employed; available on reasonable notice. SM-6316.

HIGHLY-TRAINED MECHANICAL EXECUTIVE desires position requiring broad-gage man; 20 years' manufacturing experience, as tool room foreman, general supervisor of equipment, general superintendent, works manager, assistant general manager and general manager. Successful record as executive. Familiar with best shop methods. References. SM-6317.

MECHANICAL ENGINEER, M. I. T., 21, desires position as assistant to works manager or production engineer. Vacation experience; banking and business administration. Speaks French and Spanish; has travelled in Europe and Latin America. SM-6318.

MECHANICAL AND ELECTRICAL ENGINEER, age 32; wide range of thorough experience in economic management of power plants, installation and maintenance of heavy machinery, desires change. Specialized in combustion and boiler-room problems. Now assistant master mechanic large steel mill. SM-6319.

AIR COMPRESSORS. Executive in this line desires change. Experienced design, tools, foundry and management. American; married; technical graduate. Eastern location preferred. SM-6320.

MECHANICAL ENGINEER with drawing room and outside experience power plants, mills, factories, material-handling and general mechanical and plant designing and construction. Familiar office and plant management. Age 45. Location immaterial. SM-6321.

EXECUTIVE, 10 years' experience industrial plants, desires position where executive ability is required. Diplomatic, organizer, capable manager, can devise original production methods and routine, understands factory costs. Technical graduate. Available at once. SM-6322.

DREDGING SUPERINTENDENT, civil and mechanical engineer; 15 years' executive in charge of all classes dredging, submarine rock removal, steam-shovel and dragline work. Competent to assume full charge of all projects of magnitude involving any class excavation. Will consider foreign or domestic proposition. Minimum salary $5000. SM-6323.

FACTORY ENGINEER technically-trained, mechanical, licensed structural engineer, 3 years' experience machine design; 10 years' factory planning and maintenance; 6 years building design and construction. Includes foundry, machine shop, wood shop and power plant. SM-6324.

MECHANICAL STRUCTURAL ENGINEER, age 31; 11 years' experience chief engineer, chief draftsman and designer, covering rolling mills, tube mills, special machinery furnaces, cars, production tools, steel buildings and bridges. Desires permanent connection. Initiative, tact and energy. Salary secondary, about $4200. SM-6325.

MECHANICAL SUPERINTENDENT plant engineer, master mechanic or similar position; proven ability, wide experience consulting engineer and surveyor on stationary and marine work. First-class references superintendent and chief engineer in Government service. Oil fuel specialty. Minimum salary $3600. SM-6326.

PROFESSOR or associate professor, age 38; 15 years' experience engineering subjects; 3 power plant; 8 of above in executive position. Now employed; wish larger opportunity. First-class references. SM-6327.

ASSISTANT SUPERINTENDENT to take complete charge machine and power installation, upkeep, new and reconstruction building work, fuel saving. Knows modern production methods. Reference present and any past employer. SM-6328.

MECHANICAL ENGINEER, M. E. Columbia 1921, desires connection with manufacturers internal-combustion engines; opportunity for serious work on design and general production problems. Personal and school references available. SM-6329.

ELECTRICAL ENGINEER, age 27; B. S., and E. E.; 3 years' experience along broad engineering lines, power plants, laboratory, research, works electrical engineering. Location immaterial. SM-6330.

FACTORY MANAGER, industrial engineer. Highly trained executive, thorough manufacturer, capable organizer; 18 years' intensive experience manufacturing lines; executive in plants turning out machine-shop, foundry, sheet-metal, chemical and electrical products. Immediately available; age 38. SM-6331.

MECHANICAL ENGINEER, specializing in invention, research, machine design. Can work out machines and processes from conception of fundamental principles to final details; connection with firm desiring high grade specialties to manufacture. SM-6332.

SALES ENGINEER age 33; married; technical graduate; experienced in manufacturing and general engineering work, wishes to represent reputable firm in Pacific Northwest; thorough knowledge of possibilities and conditions. Can interview in New York City. SM-6333.

EXECUTIVE employed $4000 yearly desires change; good reasons; 6 years' experience as assistant plant engineer, assistant chief engineer and assistant works manager; Excellent references. SM-6334.

MECHANICAL ENGINEER, safety and personnel; 14 years' experience. Capable of organizing and directing department in industrial relations, employment service, safety, sanitation, dispensary, fire protection, etc. State work, location, salary. SM-6335.

MECHANICAL ENGINEER and designer; varied experience in designing of jig, fixtures, gages, dies, machines, and labor-saving devices; open for engagement. Efficient in developing new ideas or intricate mechanism; inventive ability. Vicinity Bridgeport, Conn. preferred. Highest references. SM-6336.

MECHANICAL ENGINEER, Stevens 1911, married; 7 years' experience, installation of production and cost systems, in charge of shops and offices. At present in charge of plant in Virginia. Desires to locate near home in New York City. Age 33. SM-6337.

MECHANICAL-ENGINEERING STUDENT completing sophomore year at eastern technological institute desires position for summer vacation. SM-6338.

INDUSTRIAL ENGINEER. Construction and equipment engineer, central-station power-plant and distribution system. Industrial executive costs-production and management of help engaged in manufacture of iron-steel, brass, bronze, etc. Welfare and educational director. Age 42. Education: high school; International Correspondence School; Business Training Corp. New York. SM-6339.

DESIGNING ENGINEER, American, age 38; all-around man; 18 years' experience bridge-shop, steel-mill maintenance, machinery, bridge and structural steel, by-products coke-oven apparatus, steam power plant and heating, shipbuilding, etc. Reasonable salary. SM-6340.

MECHANICAL ENGINEER, age 45; technical graduate, experienced on steam, engine and steam-turbine design with knowledge power-plant engineering, desires position executive designing engineer with company manufacturing power-generating machinery in quantity, turbo or reciprocating. SM-6341.

PULVERIZED FUEL ENGINEER, 10 years' experience in design, construction, operation and supervision of complete plants and furnaces for all classes of metallurgical operations; open for executive position July 1. SM-6342.

ASSISTANT GENERAL SALES MANAGER and sales engineer, age 39; 15 years' experience in air compressors, rock drills, hoisting engines, pumps and power apparatus. Business, executive and 11 years' sales experience ability. Resigning present position. SM-6343.

SUPERINTENDENT or operating engineer of ability, with 20 years' successful practical experience covering management, production, construction, development, modern manufacturing and labor-saving methods for quality and low cost. Reliable, aggressive and open-minded. Age 41. SM-6344.

INDUSTRIAL ENGINEER, age 26; single. Valuable experience developing, designing and manufacturing precision machinery and automotive work. Exceptional references. Moderate salary. SM-6345.

ASSISTANT WORKS MANAGER or superintendent. Technically-trained mechanical engineer; age 32; married; 11 years' experience; last 6 and now works engineer for large steel and wire company. Experience covers all phases plant construction, maintenance and administration. Executive, successful in handling men. Salary commensurate with position. Location immaterial. SM-6346.

TECHNICAL GRADUATE, mechanical engineering, age 28; single; 2 years machine shop; 3½ general machine designing, machine-shop layouts, production routing, industrial building etc. Wishes position of responsibility. Location vicinity Chicago or Milwaukee. SM-6347.

COMBUSTION ENGINEER, large Canadian sulphite company open for offers. M. E. (Cornell), age 32; American. Extensive experience central-station and sulphite-mill lines on design and operation of steam-power plants. Location U. S. and Canada. SM-6348.

MECHANICAL ENGINEER, chief engineer, master mechanic. Technical graduate; 12 years' experience. Capable of taking complete charge engineering and construction. Specialist combustion, power-plant development, furnace design, etc. Desires connection with or as consultant. Location Metropolitan district preferred. SM-6349.

MECHANICAL ENGINEER, plant or production experience covering 12 years, on design and manufacture of machinery and tools, desires responsible position. SM-6350.

MECHANICAL ENGINEER, M. I. T. graduate; age 28; 6 years' experience general plant engineering, maintenance and construction, machine design, experimental and development testing of electrical apparatus. Desires production and management work, or, executive position industrial concern. SM-6351.

MECHANICAL ENGINEER, graduate; age 32; 10 years' successful experience locomotive construction as foreman, inspector, draftsman, designer. Desires live position in any line offering opportunity for advancement. SM-6352.

INDUSTRIAL ENGINEER, graduate mechanical, age 46; 11 years' present employer; familiar various phases manufacturing covering brass foundry, pattern making, punch press, brass and steel finishing, assembling work, scheduling, shop and cost accounting. Would invest in small, financially sound manufacturing business in Chicago. SM-6353.

SALES ENGINEER desires connection sales department firm manufacturing oil steam engines, pumps, turbines or similar apparatus; 7 years' mechanical, sales experience including design, construction and practical shop, various types power-plant machinery, specializing pumping machinery. Knowledge several foreign languages, willing to travel. Best references. SM-6354.

ASSISTANT MECHANICAL ENGINEER, age 25; technical graduate, 4 years' practical experience draftsman and designer, maintenance, production. Desires position with future. SM-6355.

MECHANICAL ENGINEER, boiler-shop superintendent open for engagement; executive and producer, familiar construction fire, water-tube, and Scotch marine boilers, steel plate construction in all branches, especially gas manufacturing, and oil-refinery equipment; has initiative; industrious and reliable, references from last employers. SM-6356.

INDUSTRIAL ENGINEER, University graduate; 15 years' practical experience organization, production management, control and methods, cost and general accounting, auditing, sales engineering, industrial relations, business analysis, managerial policies. Unusual experience in localized and professional work. SM-6357.

DRAFTSMAN, 8 years' experience, designer automatic machines and tools. May consider position away from New York. SM-6358.

MECHANICAL ENGINEER, age 30; experienced plant layout, construction, power-plant testing, power-cost accounting. Have assisted design and layout new manufacturing plants. Desires position where initiative and inventive ability along manufacturing line is consideration. Location not important. SM-6359.

MECHANICAL ENGINEER, 12 years' experience design and erection power-plant, heating, refrigeration, miscellaneous piping systems, desires connection where executive ability is essential. Unquestionable references. Location Boston. Available after June 1. Salary $4500. SM-6360.

MANAGING EXECUTIVE to connect with concern sincere in desire for coöperative teamwork management; wide-range experience production machine tools from castings to marketing including foundry, machine shop, accounting and sales. Desirous presenting details in person. Age 45; salary $5000. SM-6361.

ASSISTANT MECHANICAL SUPERINTENDENT, technical graduate; age 35; 4 years shop; 6 as draftsman, 3½ assistant superintendent machinery; 2 shop engineer and foreman; with excellent experience construction, maintenance of conveying and special machinery; capable layout and reconstruction mechanical equipment. At present employed, change desired account unsettled conditions. Northwest preferred. Salary $3600. SM-6362.

MECHANICAL ENGINEER, 4 years' experience general construction work industrial plant; 2 chemical engineering, plant maintenance. Familiar installation, operation and maintenance large variety mechanical and chemical equipment. Prefer sales engineering or position with advancement possibilities. SM-6363.

PLANT ENGINEER, assistant superintendent, experienced design, construction and equipment automobiles, munition and mining plants; design automatic machinery, dryers and power plants. Last 4 years charge engineering, construction, maintenance and installation of all machinery in large new plant. Age 39. SM-6364.

GENERAL SUPERINTENDENT desires change. Machinist tool maker by trade. Technical graduate; wide experience organizing, planning and handling help in plants where interchangeable parts are manufactured. Age 36; salary $6000. Best references. SM-6365.

MECHANICAL ENGINEER, technical graduate; age 40; 15 years' experience design, construction and efficient operation power plants, desires position. Philadelphia or New York. Salary $5000. SM-6366.

MECHANICAL ENGINEER, age 28; 4½ years' experience drafting, designing, machine-shop and construction work. Technically educated. Desires position of responsibility; 15 months in army. SM-6367.

MECHANICAL ENGINEER, age 38; in charge maintenance, seeks location Connecticut or vicinity in similar capacity or as production manager. Wide experience. SM-6368.

ENGINEER and public accountant desires position with manufacturer. Investment possible; 10 years' manufacturing experience; 3 cost systems, auditing, taxes. SM-6369.

MECHANICAL DEVELOPMENT SPECIALIST graduate, 15 years' practical experience designing, building, testing novel machinery in modern manufacturing plants, desires development work. Capable developing mechanical idea to systematized manufacturing basis. Reliable, energetic and resourceful. SM-6370.

SALES, ESTIMATING, or development work. Graduate mechanical engineer; 1916; age 26; married. Experience foundry equipment, sales, estimating and designing; traveling naval ordnance inspection; electrical machinery manufacturing; materials work. A-1 references. SM-6371.

DESIGNER, engineer, age 31; with 13 years' experience wide field of engineering design, industrial and mechanical. Executive, sales or board position desired. Location immaterial, travel part time. SM-6372.

MECHANICAL ENGINEER. Stevens graduate, age 25; 3 years' marine-engineering experience; seeks position offering training in modern production methods. SM-6373.

ENGINEERING EXECUTIVE, broad experience charge of construction, organization and operation of largest chemical plants in country, open for position on or about July 1. Salary $7500. Excellent and influential connections. Consider proposition in any part of world. SM-6374.

MECHANICAL ENGINEER, M. E. Cornell, age 28. 5 years' combustion and power engineer oil and coal-fired plant, Smith gas producer plant; assistant works engineer manufacturing plant employing 2000 men; traveling power engineer for five plants in middle west; executive. Excellent references; employed. SM-6375.

EXPERIMENTAL AND FACTORY ENGINEER, 10 years' service Edison in charge laboratory, plant and service departments. Layout and installation of equipment. SM-6376.

WORKS MANAGER, competent to handle engineering or manufacture and get results, 15 years' automotive design and construction; specialist mass production. SM-6377.

EFFICIENCY ENGINEER, 10 years' experience organization and management planning, cost finding, factory layout, equipment and manufacturing processes. Age 32; married. Desires position progressive organization. Connecticut or New England preferred. SM-6378.

CONTRACT MANAGER, graduate mechanical engineer and attorney-at-law, experienced writing contracts and engineering specifications, also as assistant engineer in charge. SM-6379.

PLANT ENGINEER, age 31. Experience covers increasing production present plants, planning, taking charge building and equipping new plants. Maintenance plant and power plant. Ferrous and non-ferrous alloy foundry practice and up-to-date production methods. Good organizer, fine record accomplished results. SM-6380.

MECHANICAL ENGINEER, M. I. T. graduate, age 23; single; commissioned officer during war, desires position offering advancement. Minimum salary $2200. Location immaterial. SM-6381.

MECHANICAL ENGINEER, technical graduate; age 36; married; 14 years' experience, factory engineering, construction and plant maintenance, designing, building special improved machinery, labor-saving devices, etc. SM-6382.

MECHANICAL ELECTRICAL ENGINEER, (Columbia 28) construction and operating experience, ability to get results, seeks position as mechanical superintendent. SM-6383.

SALES ENGINEER, age 27; mechanical; 7 years' designing, selling experience; heating and ventilation power plant. Desires change with progressive firm of engineering equipment. SM-6384.

PRODUCTION AND INDUSTRIAL ENGINEER, M. E. graduate, age 28, practical machinist, broad experience time and motion-study work, production, standardization, installation of systems, planning and routing, etc. desires connection consulting industrial engineer or progressive manufacturing concern. SM-6385.

AUTOMOTIVE ENGINEER, graduate mechanical, 6 years' experience gasoline engines and cars, desires to connect with engine or automobile manufacturer. SM-6386.

MECHANICAL ENGINEER, 17 years' experience general power-plant design; also special work; forced hot-water heating and refrigerating. Available immediately. SM-6387.

EQUIPMENT ENGINEER, year and half original design, year factory layout and purchase of machinery. Illinois 1917, M. I. T. Employed; location Seattle. SM-6388.

INSTRUCTOR, technical school graduate, 10 years' practical experience brass industry, machine and tool building; past 4 years instructor machine-shop practice. Location immaterial. SM-6389.

MECHANICAL ENGINEER, technical graduate, 5 years' shop and design experience oil engines; 2 years assistant chief engineer and in charge drafting Diesel engine development, now in abeyance because of industrial conditions. Business and executive ability. Best references. SM-6390.

MECHANICAL ENGINEER, 18 years shop and office experience, successful record shop foreman, master mechanic, chief draftsman, planning engineer, seeks connection with progressive concern chief draftsman, chief tool designer or production engineer. Salary $3000. Will go anywhere. SM-6391.

SUPERINTENDENT or ASSISTANT MANAGER, age 33, graduate M. I. T.; 11 years' in textile field as foreman, construction engineer power plant and buildings, at present general superintendent in charge personnel and production. Desires wider range work and responsibility. References. Location New York or New England. SM-6392.

ENGINEER, 3 years' experience unusually broad character large manufacturing plant. Experience construction work, structural and hydraulic engineering. Age 32; degree. Desires position consulting, construction or industrial engineers. Initial demands moderate. SM-6393.

ENGINEER EXECUTIVE, age 38; proven ability, wishes to connect as assistant to general manager or president. Preferably in manufacturing concern. SM-6394.

PLANT ENGINEER, or master mechanic. American; age 32; 10 years' broad experience design, installation, maintenance, and successful handling of labor. SM-6395.

CONTRACT MANAGER, graduate engineer; age 32; 8 years' experience writing, handling, and execution of large engineering contracts. SM-6396.

SALES ENGINEER, wide acquaintance and knowledge of conditions in Eastern territory; can furnish adequate representation for high-class technical product. SM-6397.

FOUNDRY SUPERINTENDENT, manager; may change. Practical mechanic and engineer; business knowledge; competitors cut wages too; increase production. SM-6398.

EXECUTIVE. Sales or factory management, experienced design, manufacture and sale of power apparatus, and quantity production of small parts. SM-6399.

FOREIGN SALES MANAGER. Graduate mechanical engineer, age 41; American; 7 years' experience Japan, 8 years' in America, covering sales broad of line of industrial machinery. At present engaged investigation machinery markets in every country in Asia. Will return to U. S. in June and be available for new position. Thoroughly conversant with export of machinery and proved success. SM-6400.

WORKS MANAGER OR SUPERINTENDENT. Broad experience; high grade man; up-to-date methods. Permanent position; A-1 references. American; age 40; married. SM-6401.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JUNE 29, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically.

Unless objection is made to any of the candidates by June 29, 1921, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

GLASS, JOHN B., Plant Engineer, Chickasaw Shipbuilding & Car Co., Chickasaw

HIXON, CHARLES R., Associate Professor, Mechanical Engineering, Alabama Polytechnic Institute, Auburn

California

BELL, THOMAS R., Draftsman, Standard Oil Co., El Segundo

CHRISTENSEN, WILLIAM P., Engineer, Engineering and Specialty Department, Crane Co., San Francisco

LAWLER, FRANK P., Structural and Mechanical Engineer, Frank G. Baum, San Francisco

McBRYDE, WARREN H., Assistant to General Manager, California & Hawaiian Sugar Refining Co., San Francisco

MOORE, CHARLES E., Head Machine Tool Department, Harron Richard & McCone, Los Angeles

PERKINS, MYLES S., Claremont

POWERS, FELIX W., Sales Engineer, York California Construction Co., Los Angeles

SIPRELLE, CHESTER D., Lubricating Engineer Standard Oil Co., San Francisco

Connecticut

DODGE, CLIFFORD F., Planning Engineer, New Britain Machine Co., New Britain

GIFFEN, HARRY W., Chief Engine Draftsman Electric Boat Co., Groton

JOHNSON, CARL H., Proprietor, Atlas Tool Works, Bridgeport

SMITH, EARL E., Hartford Fairmont Co., Hartford

District of Columbia

KAREL, FREDERICK, Engineer, Department of Equipment, United States Railroad Administration, Washington

Illinois

AMSTUTZ, J. B., Tool Designer, Wolff Manufacturing Co., Chicago

BREADY, IRA J., Sales Engineer, The Permutit Co., Chicago

ERICKSON, WILLIAM N., Sales Engineer, The Permutit Co., Chicago

HRICOVSKY, GEORGE, JR., Leading Draftsman, The Pullman Co., Pullman, Chicago

LEWIS, MONROE W., Production Engineer, Austin Manufacturing Co., Harvey

MITCHELL, EDWIN F., American Manganese Steel Co., Chicago

NELSON, O. T., President, General Boilers Co., Waukegan

OLSEN, JOHN K., Chief Draftsman, Stewart Warner Speedometer Corpn., Chicago

PEIRSON, MARTIN B., Sales Engineer, Power Plant Specialty Co., Chicago

PRUYN, HENRY S., JR., Proprietor and Manager, Pruyn Bearings Exchange, Chicago

ROBINSON, OTTO L., Assistant Professor, Armour Institute of Technology, Chicago

SIEGER, ROBERT E., Engineer Foreman, Swift & Co., Chicago

SHEDD, WARD R., Plant Engineer, Barber Coleman Co., Rockford

Indiana

BURKE, WALTER S., Eastern Manager, Green Engineering Co., East Chicago

CLEAVENGER, WILLIAM D., Mechanical Superintendent, Steel & Tube Co., of America, Indiana Harbor

HARTER, LABAN W., Superintendent of Power, Oliver Chilled Plow Works, South Bend

McLELLAN, HARRY J., Statistical Department, Indiana & Michigan Electric Co., South Bend

Kansas

HOLZER, HIRAM A., Superintendent, United Iron Works, Inc., Pittsburgh

Kentucky

MEYNS, LAWRENCE J., Lieutenant, Ordnance Department, United States Army, Camp Knox

Maine

WHITON, GARDNER W., Chief Draftsman, Saco-Lowell Shops, Biddeford

Maryland

WANICEK, JOHN J., Mechanical Laboratorian, United States Naval Engineering Experimental Station, Annapolis

Massachusetts

GOODWIN, HAROLD L., Boston

GOULD, JOSEPH H., JR., Boston

GREENHALGH, JOHN, Designing and construction Engineer, The Viscoloid Co., Leominster

HIRST, RUSSELL W., Manager, Boston Office, Buffalo Forge Co., Boston

HUMPHREYS, THEODORE F., Traveling Engineer, The H. B. Smith Co., Westfield

KERR, ARTHUR J., Sales Engineer, The Foxboro Co., Inc., Foxboro

McINTYRE, FREDERICK W., General Sales Manager, Reed-Prentice Co., Worcester

MEYER, GUSTAV E., Steam Turbine Installation Foreman, General Electric Co., Boston

ROYS, FRANCIS W., Assistant Professor, Mechanical Engineering, Worcester Polytechnic Institute, Worcester

SCHELL, ERWIN H., Consulting Engineer, (Re-election) Boston

WARSHAW, NATHANIEL, Chief Engineer, Murray & Tregurtha Corpn., Atlantic

Michigan

ARMITAGE, JOHN B., Mechanical Engineer, Lockwood-Greene & Co., Detroit

ASHBY, LEONARD J., Chief Inspector, Handley Knight Co., Kalamazoo

ENGLAND, ERNEST W., Sales Engineer, The Carey Co., Detroit

NEWHOUSE, WALTER F., General Superintendent, Saranac Machine Co., Benton Harbor

STACY, STANLEY C., The Solvay Process Co., Detroit

Missouri

BLACKWELL, HUBERT C., Vice-President and General Manager, Kansas City Power & Light Co., Kansas City

JOWETT, EDWIN, Superintendent of Production, Design and Construction, Kansas City Power & Light Co., Kansas City

LAUER, STEWART E., President, Pilsbury Becker Engineering & Supply Co., St. Louis

LOHBILLER, HARRY J., Chief Engineer, Urbauer Atwood Co., St. Louis

RASMUSSEN, ABBEY A., Estimator, Johnss Manville, Inc., St. Louis

STOCKWELL, RALPH W., Member of Stockwell & Stockwell, St. Louis

New Jersey

APPERT, HENRY J., JR., Allendale

FRANK, JACOB, Structural Worker, Submarine Boat Corpn., Port Newark

HALL, LEO G., Engineer, Construction Department, Willys Corpn., Elizabeth

KOLBERT, EDWARD O., Assistant to General Manager, Edison Storage Battery Co., West Orange

NEWBURY, HORACE A., Jersey City

NICHOLS, ARTHUR D., Avenel

NYDEGGER, PAUL F., Superintendent, The Singer Manufacturing Co., Elizabethport

SEAVEY, FRANK O., Designing Engineer, H. R. Worthington, Harrison

THOMAS, ROSS R., South Dennis

WEBER, FERDINAND W., Allendale

ZIMMERMAN, ROBERT D., High Speed Tool Tester, Ingersoll-Rand Co., Phillipsburg

New York

AMORY, FREMONT D., JR., Contracting Architectural Engineer, New York

BOCCHETTO, VINCENT, New York

ECKERT, HENRY R., George B. Granger Co., New York

FARRELLY, BERNARD F., Ocean Accident and Guarantee Corpn., Ltd., New York

FORSYTH, WILLIAM R., Engineering Department, American Trading Co., New York

GERHARD, WILLIAM G., Test Engineer, Alberger Pump Co., Newburgh

GREINER, JOHN A., Greiner, Semon, Lowry Co., Syracuse

GRIEB, JOHN J., Chief Engineer, Ryther & Pringle Co., Carthage

HOUSE, FRANK R., Engineer, Sperry Gyroscope Co., Brooklyn

KILBY, CLARENCE E., Engineer, The Engineer Co., New York

KIMBALL, NORMAN F., Chief Engineer, The O. J. Childs Co., Utica
LIPMAN, LEWIS, Industrial Sales Engineer, American Radiator Co., Buffalo
LUTZ, WERNER A., Engineer and Estimator, Johnson & Morris, New York
McLAIN, ROBERT H., Engineer, Power and Mining Engineering Department, General Electric Co., Schenectady
MacGREGOR, WILLARD H., Advisory Engineer, Deering Milliken & Co., New York
MASSIE, ARNOLD C., Mount Vernon
MILLS, BERNARD, Superintendent Engineer, United American Lines, New York
O'REGAN, STEPHEN P., Marine Engineer, Munson Steamship Line, New York
PANTALEO, GIUSEPPE P., Mechanical Engineer, The Sperry Gyroscope Co., Brooklyn
PLATT, LOUIS J., Manager, Eastern District, Kroeschell Bros., New York
RADIN, JULIUS, New York
ROUNDY, CARYL H., Chief Scientific Section, United States Navy Yard, New York
SEEHUSEN, FRANK C., Industrial Engineer, The Foundation Co., New York
SEXAUER, LLEWELLYN C., Engineer, The Foundation Co., New York
SPITLER, EDWARD W., Squad Chief, Mechanical Department, The Foundation Co., New York
TAYLOR, JOHN W., Brooklyn
TEAZE, MOSES H., Project Engineer, Hardy S. Ferguson, New York

North Carolina

HOWARD, WILLIAM J., Chief Engineer, Durham Traction Co., Durham
LINTON, WILLIAM D., JR., Durham Traction Co., Durham

Ohio

BURKE, JOSEPH T., Construction Engineer, Otis Elevator Co., Cleveland
EVANS, ROBERT T., Executive Engineer, International Harvester Co., Akron
HASKELL, JOHN D., Engineer, Draftsman, Management Engineering & Development Co., Dayton
KAISER, HOWARD W., Assistant Mechanical Engineer, Water Department, City of Cleveland, Cleveland
KAY, GEORGE A., Superintendent of Production, National Supply Co., Toledo
LIGGETT, WILLIAM K., The Jeffrey Manufacturing Co., Columbus
LLOYD, JOHN C., Designer, B. M. Baxter, Cleveland
LOEBLEIN, JOHN M., Superintendent, United States Copper Production Corpn., Cleveland
LUDWIG, WALTER W., Cadet Engineer, Buckeye Pipe Line Co., Lima
OTTO, ERIC A., Estimator, The Carey Co., Cleveland
SHIE CLIFFORD H., Assistant Mechanical Engineer, Power Division of Water Department, City of Cleveland, Cleveland

Oklahoma

ADAMS, WILLIAM M., Machine Shop Foreman, Mideo Gasoline Co., Bartlesville

Oregon

WILLIAMS, A. H. T., Chief Engineer, North West Bridge & Iron Co., Portland

Pennsylvania

BARNES, JOSEPH M., Chief Mechanical Draftsman, The Philadelphia Electric Co., Philadelphia
BLAND, MILES C., Engineer, Erection Department, Bethlehem Steel Bridge Corpn., Steelton
DAWSON, WILLIAM S., Practicing Engineer, Duquesne Gardner Amusement Co., Pittsburgh
GILBERT, JOSEPH C., Designing Draftsman, Barrett Co., Frankford, Philadelphia
GLISSON, ALFRED, Designing Engineer, Eddystone Steel Co., Crum Lynne
HECKEROTH, WILLIAM C., Chief Engineer, Erie City Iron Works, Erie
LUKENS, THOMPSON H., Master Mechanic, Nelson Valve Co., Chestnut Hill, Philadelphia
McBURNEY, WILLIAM A., Inspector, Norfolk & Western Railway Co., Baldwin Locomotive Works, Philadelphia
MORRIS, SYDNEY S., Engineer, Partner, Baeuerle & Morris, Philadelphia
ROOSEVELT, NICHOLAS G., Vice-President, Day & Zimmermann, Inc., Philadelphia
RUCKMAN, JOHN H., Independent Practice, Philadelphia
SANFORD, LEIGH R., Engineer, United States Shipping Board, Emergency Fleet Corpn., Philadelphia

Rhode Island

HESS, WINTER, Western Manager and Engineer, Builders Iron Foundry, Providence

Tennessee

BEAUCHEMIN, ALPHONSE O., Layne & Bowler Co., Memphis

Texas

WILLIAMS, WILLIAM G., Southwestern Pump & Engineering Co., Dallas

Virginia

HARRISON, W. L., Inspector, Newport News Shipbuilding & Dry Dock Co., Newport News
MARLEY, JAMES J., Resident Engineer, James L. Carey, Hopewell

Washington

ANDERSON, WOODWORTH, Sales Engineer Worthington Pump & Machinery Corpn., Seattle
McNEAL, WILLIAM R., Superintendent of Buildings and Grounds, Seattle School District, Seattle

Wisconsin

BEALS, EDWARD D., President, Hardwood Products Co., Neenah
HIRSHHEIMER, LOUIS C., Secretary, La Crosse Plow Co., La Crosse
MARTIN, CHARLES R., Hydraulic Engineer, Allis-Chalmers Manufacturing Co., Milwaukee

Canada

JETTE, CHARLES H., Field Engineer and Chief Draftsman, St. Maurice Paper Co., Cape Madeleine, Ont.
McKIEL, HAROLD W., Professor of Engineering, Mt. Allison University, Sackville, New Brunswick
PORTER, ALEXANDER D., Engineer in Charge of Equipment Section, Grand Trunk Railways; Arbitration; Departmemt of Railways & Canals, Montreal, Que.
RAITT, GEORGE H., Massey Harris Co., Ltd., Toronto, Ont.
WELLINGTON, CYRUS, Manager, Toronto Office, Greens Economizer, Ltd., Toronto, Ont.

England

TOLPUTT, HERBERT, Sole Owner, Motor Engineering Garage & Repair Shops, Sheffield

Germany

ORENSTEIN, DR. ING. H., Consulting Engineer, Berlin

South America

BOLLO, FELIX P., Assistant to General Engineer, Compania Swift International, Puerto La Plata, Argentine

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE-MEMBER

Illinois

MITCHELL, GLENN D., Engineer of Tests, Sinclair Refining Co., Chicago

New Jersey

FISHER, WILLIAM N., Monroe Calculating Machine Co., Orange

New York

MORSE, ALBERT W., President, The Anthony Co., Long Island City
SEMMES, GEORGE W., Vice-President, Akerlund & Semmes, Inc., New York
WICHUM, VICTOR, C. J. Tagliabue Manufacturing Co., Brooklyn

Ohio

KERR, THOMAS H., Engineer and Superintendent of Meter Department, Ohio Fuel Supply Co., Columbus
SKELDON, DAVID F., Vice President, The Joseph L. Skeldon Engineering Co., Toledo

Pennsylvania

BATTLE, JOHN R., President and Chief Engineer, J. R. Battle Co., Inc., Philadelphia
LUKENS, WILLIAM L., Ordnance Engineer, Bethlehem Steel Co., Bethlehem
STRUBLE, GEORGE W., Manager of Ordnance, Bethlehem Steel Co., Bethlehem

Wyoming

KOCH, BRUNO F., Shop Engineer, Chicago, Burlington & Quincy Railroad Co., Sheridan

PROMOTION FROM JUNIOR

Indiana

CARLISLE, CHARLES A., JR., Secretary and Treasurer, Perkins Corpn., Mishawaka

Massachusetts

DAVIS, FRANCIS P., Engine Department, Associated Factory Mutual Fire Insurance Cos., Boston
MacNAUGHTON, EDGAR, Professor of Mechanical Engineering, Tufts College, Medford

New York

CARTMELL, NATHANIEL M., Industrial Engineer, C. E. Knoeppel & Co., New York
deREVERE, ARTHUR W., General Sales Manager Green Fuel Economizer Co., New York
STEELE, FRANCIS J., JR., Engineer Officer, United States Navy, U. S. S. Beaufort

Ohio

BENNETT, THOMAS A., Division Manager, Mechanical Sales, B. F. Goodrich Co., Akron

Pennsylvania

ROGERS, JOHN I., Founder, Engineer and Treasurer, Egan-Rogers Steel & Iron Co., Crum Lynn

Texas

WILSON, CHARLES S., Chief Chemist, Southern Pacific Railroad Co., Houston

Wisconsin

PARMELY, J. CLYDE, Superintendent of Construction, Milwaukee Electric Railway & Light Co., Milwaukee

Canada

FERRY, RALPH M., Superintendent, Toronto Works, Northern Aluminum Co., Ltd., Toronto, Ont.

Germany

ROESLER, RUDOLF, Consulting Engineer, Munich, Bavaria

Japan

SAWAMURA, NOBUE, Mechanical Chief Engineer, Technical Department, Japanese Navy, Tokio

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In Two Sections—Section Two

MECHANICAL ENGINEERING

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Vol. 43, No. 7 — A.S.M.E. AFFAIRS — July, 1921

COUNCIL CONVENES AT SPRING MEETING

Regional Meeting Approved for Cleveland and Kansas City; Reports Adopted

The May meeting of the Council was held on May 23 in connection with the Spring Meeting of the Society in Chicago. There were present: President E. S. Carman; Vice-Presidents R. H. Fernald, L. P. Alford, John L. Harrington, Robert B. Wolf; Managers C. Russ Richards, F. O. Wells, Earl F. Scott, L. C. Nordmeyer, H. M. Norris, E. C. Fisher, C. L. Newcomb, D. S. Kimball; Past-Presidents Ira N. Hollis, D. S. Jacobus, Fred J. Miller; Chairman of Standing Committees: R. V. Wright, Meetings and Program; W. H. Kenerson, Local Sections; A. D. Bailey, representing E. B. Katte, Professional Divisions; John L. Harrington, Constitution and By-Laws; Fred R. Low, Power Test Codes; Secretary Calvin W. Rice; Assistant Secretary Wm. E. Bullock; Federated American Engineering Societies, L. W. Wallace, Executive Secretary; L. P. Alford, Chairman A.S.M.E. representatives on American Engineering Council; and following committeemen: E. L. Ohle, Constitution and By-Laws Committee; W. W. Varney, Nominating Committee; J. W. Herron, Charles Penrose, Local Sections Committee; H. S. Philbrick, Chairman, Chicago Local Section Committee.

Attendance at Meetings. The Council received a special report from the President on attendance of members of Committees and the Secretary was directed to communicate with any member of Council or of a Committee failing in attendance at meetings. This action was not taken on account of any particular delinquency in attendance, but simply to insure, in such a large organization as ours, that members accepting the responsibilities of committee appointments should endeavor to meet their obligations.

Regional Meetings Approved

Regional Meetings were approved in Cleveland on October 3 and 4 and in Kansas City early in November, and regular meetings of the Council will be held in these cities in connection with these meetings. The Meetings and Program Committee recommended to the Council legislation for the control of these regional meetings to avoid conflict with Spring and Annual Meetings and with each other.

Committee on Constitution and By-Laws Reports

New Constitution of the Society. The report of the Committee on Constitution and By-Laws of a proposed new Constitution was received and referred to the Semi-Annual Business Meeting held on the following day. (A full account of this meeting is published elsewhere.) Every member of the Society is urged to take part in the general discussion of this Constitution before the Annual Meeting when it will be brought up for second reading.

Local Sections. A petition of members for the establishment of a Local Section in Kansas City was approved.

Professional Divisions. Rules for the operation of the Divisions were reported. The total registration in all the Divisions to date was announced as 6910.

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THE OPPORTUNITY A.S.M.E. OFFERS

. . . But to the man whose professional interest is not bounded by his individual practice, membership in a live society offers the avenue for participation in the wider activities and identification with the achievements of the profession; and he will find that the dividends which he receive upon his membership will increase in proportion with his own share in the common effort. . . .

FRED R. LOW.

STEVENS HONORS A.S.M.E. MEMBERS WITH DEGREES

Members of the Society will be interested in noting that of the twenty-six candidates for the honorary degree of doctor of engineering conferred by the Stevens Institute of Technology at its forty-ninth annual commencement on June 21, twelve are members of this Society. Non-graduates of that institution receiving the degree are Charles M. Schwab, chairman of the Board of Directors of the Bethlehem Steel Corporation, and Elmer Ambrose Sperry, president of the Sperry Gyroscope Company. Graduates who are among the recipients are:

Frank McDowell Leavitt, '75
Frank E. Idell, '77
Lewis Hallock Nash, '77
Edward A. Uehling, '77
George Meade Bond, '80
John William Lieb, '80
Prof. Wm. Thomas Magruder, '81
Lingan Strother Randolph, '83
John Anderson Bensel, '84
Richard Henry Rice, '84

BALTIMORE ENGINEERS' CLUB HOLDS ITS FORMAL OPENING

The Baltimore Engineers' Club held its formal opening in rooms in the Commerce Trust Building which were occupied by the Shipping Board during the war. On the third floor there is an auditorium with a seating capacity of five hundred people. Among other conveniences which this club includes are a library, dining rooms and pool room, with a large lounge in the center of the building. Following the reception in the club rooms, a dance was held at the Southern Hotel.

The Engineers' Club has now approximately six hundred members, and has affiliate with it the sections of the various national engineering societies in Baltimore, and in this way, it reaches approximately 1500 engineers and chemists.

ERRATUM

Referring to the Report of the Nominating Committee on page 65 of Section Two of the June issue of MECHANICAL ENGINEERING, Mr. W. H. Wiley is the only candidate for the office of treasurer of the Society. The name of Mr. Charles A. Booth of Buffalo was inadvertently transposed from the list of delegates to the American Engineering Council, where it should have appeared.

LOCAL SECTIONS HOLD CONFERENCE AT SPRING MEETING

Delegates Meet to Discuss the Policy and Development of Sections and Society

In accordance with the practice established several years ago, a conference of representatives of the various Local Sections was arranged at the Spring Meeting and the following representatives were in attendance:

E. H. AHARA, Mishawaka, Ind.
CHARLES BROSSMAN, Indianapolis
H. E. BUSSEY, Atlanta
W. P. CAINE, Birmingham
HORACE CARPENTER, Chicago
F. A. COLLINS, JR., Rochester
F. H. DORNER, Milwaukee
LORING FREED, Toledo
W. R. GILLAM, Akron
JOHN LYLE HARRINGTON, Council and Kansas City
ERNEST HARTFORD, Secretary, Committee on Local Sections, New York
J. H. HERRON, Committee on Local Sections, and Cleveland
HARRY HILDENBRAND, Houston
E. R. JACKSON, Tri-Cities
L. C. NORDMEYER, St. Louis
ERIK OBERG, Finance Committee, N. Y.
CHARLES PENROSE, Committee on Local Sections and Philadelphia
H. S. PHILBRICK, Chicago
CHARLES RUSS RICHARDS, Council
R. L. SACKETT, Central Pennsylvania
MAX TOLTZ, Minnesota
L. S. TRACY, Syracuse
P. F. WALKER, Mid-Continent
G. A. WESCHLER, Washington
HENRY WILSON, Cleveland
D. ROBERT YARNALL, Philadelphia

Aim of Conferences

The aim of these conferences is to enable the various Sections to profit by the experiences of one another and to discuss matters and policy and developments covering both the work of the Sections and the Society as a whole.

Naturally, at the Spring Meeting Conference the trend of the discussion was regarding the financial situation. The sense of the meeting was practically unanimously in favor of every possible economy consistent with active functioning by the Sections, and the spirit of coöperation which was evident augurs well for a progressive and profitable season beginning next fall.

Local Sections and the Student Branches

The conference also laid special emphasis on the desirability of the Local Sections coöperating closely with the Student Branches in their respective territories. The membership of the Society is encouraged to coöperate in this activity by volunteering to present papers before Student Branches located in the vicinity of their homes, or at such places that they may happen to visit from time to time.

Special arrangements were made whereby those attending the Council meeting had luncheon with the members of the Council and officers of the

Society and chairmen of the Standing Committees, and in this way had opportunity to get acquainted with them and for each group to become conversant with some of the problems of the other.

At the luncheon each person was introduced, and short addresses were made by President Carman, Secretary Rice, and the chairman of the Committee on Local Sections, Dr. W. H. Kenerson.

SECRETARY'S LETTER

Desirability of Unity of Effort and a Common Goal

The Spring Meeting was a success.

It has become a custom every year to rejoice at the largest registration, indicating, as it does, the increasing interest taken in the meetings of the Society, and this year was no exception.

We all receive inspiration at these national meetings, but our real success will be measured by the degree to which we devote ourselves to advancing the engineering profession in its several fields of endeavor.

In his address at the commencement of Columbia University, President Butler pictured the University in 1950. It would be a profitable thing, now, if every member of the Society, particularly those serving on committees, would endeavor to form a conception of what the Society will be in 1950, and then work toward a common goal.

In order that there may be a unity of effort the Secretary would be pleased to receive suggestions, which he will take up with the President, Council, and the Committees having the guidance of the Society in their care, and develop a program on which we may concentrate.

CALVIN W. RICE,
Secretary.

ANNUAL MEETING DENVER SECTION A. I. E. E. MAY 21

Following the election of officers, Prof. L. D. Crain, of the Colorado Agricultural College, spoke very interestingly and instructively on Electricity on the Farm. Progress has been slow in the use of electricity and machinery of all kinds, for three reasons: first, economic considerations, where the use of machinery applicable only on very large farms has been attempted on farms from twenty to one hundred acres, with considerable economic loss. Second, lack of knowledge on the part of the farmer, in not being sufficiently educated in engineering and mechanics to be able to maintain his machinery in a proper condition, and thus likely to overwork it and otherwise unconsciously mistreat it. Third, lack of sound salesmanship on the part of manufacturing or distributing salesmen, in which many of them are too prone to sell for the sake of selling, and are not particular to sell the right thing for the particular work involved. When the right machinery and electricity are used on a farm, the two outstanding features of advantage are the greater amount of work that can be performed by machinery over that of animal and man power and the comforts and luxuries for the farm home life, which raises the standard of living to modern levels, so that the farm becomes a home—a place for real living, instead, as is often the case, of a place for mere existence.

BUDGET APPROPRIATION CONFERENCE

To discuss the budget appropriations to be made for the latter part of this year and the first half of next, a meeting has been called for Friday, July 29, of the chairman of the Standing Committees, the President and the President-elect, the Secretary and members of the Finance Committee to discuss the 1921-22 budget appropriations.

The Local Sections of the Society are very appreciative of the interest which John A. Stevens has taken in addressing meetings of Local Sections through the eastern and southern sections of the country. To date he has spoken before twelve Local Sections on the Superpower Station and Movement.

SEVEN PROFESSIONAL DIVISIONS CONDUCT SESSIONS AT CHICAGO

Reports of Progress Received from All Divisions at Meeting of Standing Committees

Seven out of the twelve Professional Divisions conducted technical sessions at the Spring Meeting in Chicago, and in addition the Standing Committee on Professional Divisions held a stated meeting and three of the Executive Committees of the Divisions held committee meetings.

Standing Committee Meeting

There was an attendance of fourteen at the meeting of the Standing Committee and nine of the Divisions were represented. The rules for the Guidance of Professional Divisions as published in the last issue of MECHANICAL ENGINEERING were adopted. These rules provide for the election of two members of the Executive Committees each year, but since most of the committees are new it was resolved to leave this matter in the hands of each Executive Committee to act in its discretion. The form of affiliate membership blank was approved. Reports of progress were received either in person or in writing from all the Divisions. The next meeting of the Committee was called for Cleveland, Ohio, in conjunction with the Standing Committee of the Local Sections and the regional meetings of the Society to be held in that city October 3 and 4.

Notes from the Divisions

Through the courtesy of Colonel Ruggles, the Ordnance Division has received an invitation to visit the Aberdeen Proving Grounds in the fall. The Aeronautic Division will probably participate in this meeting, as will also the Society of Automotive Engineers, and it may be that the occasion will be developed into a regional meeting of the Society.

The Gas Power Division is endeavoring to secure Sir Dugald Clerk for the Annual Meeting, and Mr. Van H. Manning, Chairman of the Executive Committee, who is visiting England now, is conveying a personal invitation to Sir Dugald.

The Forest Products Division is planning a session at the Annual Meeting on Reforestation as its contribution to the program on Elimination of Waste in the Industries.

The Fuels Division would still like to hear from some of the Local Sections that have not yet appointed local Fuel Committees.

The Materials Handling Division hopes to secure Mr. Charles M. Schwab for the Annual Meeting to speak on elimination of waste in the steel industry. This Division is one of the most active of all. It is interested in snow removal and is also planning meetings on the handling of materials in ports, with Boston, New York, Philadelphia, and Baltimore as suggested places of meetings.

The Machine Shop Division will coöperate very closely with the National Machine Tool Builders Association and will develop a joint committee on Machine Tool Standardization.

The Executive Committee of the Management Division is still holding monthly meetings. The Division will inaugurate the work of establishing a scale for measurement of effectiveness of management. This Division made important contributions to the Spring Meeting in Chicago as described in MECHANICAL ENGINEERING; the report of the Executive Committee for the year is of particular interest.

The Railroad Division is planning a session for the forthcoming Annual Meeting.

The Textile Division is contemplating meetings at textile centers in coöperation with the Local Sections, and also a session at Atlanta, Georgia, at the time of the 1922 Spring Meeting.

COUNCIL CONVENES AT SPRING MEETING

(Continued from page 77)

Student Branches. Student Branches at the Agricultural and Mechanical College of Texas and the University of Texas were approved.

Nominating Committee. The question of recommending an amendment to the By-Laws to enable the Nominating Committee to meet at the Spring Meeting was referred to the Committee on Constitution and By-Laws.

Research. A grant of $500 was made to this Commitee for the use of Prof. Harvey N. Davis, in connection with his work of extending the upper limit of the Marks and Davis Steam Tables.

Boiler Code. The interpretations of April 19, 1921, published in this issue of MECHANICAL ENGINEERING were approved as corrected. The A.S.M.E. Boiler Stamp was ordered copyrighted. The appointment of Mr. A. G. Pack, Chief Inspector, Bureau of Locomotive Inspection, Interstate Commerce Commission, Washington, D. C. on the Sub-Committee of the Boiler Code Committee on Welding was approved.

Power Test Codes. The Executive Committee of the Council was authorized to approve new codes completed during the Summer months and to authorize printing in MECHANICAL ENGINEERING and presentation for discussion at the next Annual Meeting in December.

Personnel of Deputation to England

Deputation to England. Past-President Hollis was appointed chairman of the A.S.M.E. delegation. The entire party comprises:

Ambrose Swasey, Chairman, also Chairman of John Fritz Medal Board.

A.S.C.E.	A.I.M.E.
Main, Chairman	Dwight, Chairman
Cummings,	Rand
Henny,	
Freeman.	
A.S.M.E.	**A.I.E.E.**
Hollis, Chairman	Jewett, Chairman
Smith	Kennelly
	Squier

Special Report. Adoption by the Society of the Report of the Special Committee on Standard Tonnage Basis for Refrigeration was approved and also of the Report of the Special Committee on Steel Roller Chains, dated May 19, 1920. The Progress Report of the Standing Committee on Technical Nomenclature was approved and ordered printed in MECHANICAL ENGINEERING.

American Engineering Council. Mr. L. W. Wallace, Executive Secretary, was present and made a report of the current activities of the Federation.

Standards. The admission of the American Institute of Architects to the American Engineering Standards Committee was approved.

The Sectional Committee on International Standard for Pipe Threads was discharged.

American Association for the Advancement of Science. Past-President Hollis and Prof. Robert W. Angus, Toronto, Canada, were appointed as Honorary Councillors of the Association as representing this Society at the meeting of the Association in Toronto December next.

Death of Mr. G. J. Foran. The Council received with regret the announcement of the death of Mr. George Jesse Foran, and on the recommendation of the Committee on Publication and Papers the following resolutions were adopted:

Resolved: That in the death of George Jesse Foran, this Society has lost an old friend and valued member, whose time and talents were ever at its disposal, and whose faithful work and wise counsels as a member of this body and of other important committees, and the patriotic engineering service he so ably rendered to the Government during the War, are deeply appreciated.

Adjournment was taken to meet in Cleveland in connection with the Regional Meeting on October 3 and 4. The Executive Committee will act for the Council in the interim between these meetings.

CALVIN W. RICE,
Secretary.

MEMBERS EAGER TO SERVE ON TECHNICAL COMMITTEES

About 700 Members Available at Present Time for Committee Service

As the result of a letter from President Carman to the members, volunteers are coming in for service on the technical committees of the Society.

At the present time there are on file at headquarters the names of about 700 members who are available for committee service, and the next thing to do is to find jobs for these willing workers.

The Society has 65 technical committees at present, averaging seven members each, 37 administrative committees with about the same average membership, and 43 Local Sections executive committees. The twelve Professional Divisions require 60 members for their Executive Committees and 12 secretaries, and about 160 other members have been appointed on subcommittees of the Professional Divisions. It is seen, therefore, that with our membership of 14,000 what we need is more committees and sub-committees and more jobs for those who are willing to serve.

Naturally every man wants to be given responsibility and assigned to a committee, but it is nevertheless a fact that a member can perform service in many other ways than by actual appointment on a committee. A word here and there about the work the Society is doing, its meetings, its publications, its committee activities, its Local Sections, its Professional Divisions, will interest others in membership. A letter to MECHANICAL ENGINEERING will always receive consideration for publication. Local executive committees are always looking for workers to develop acquaintanceship. Suggestions for papers are always in order, as are also ideas for developing the general activities of the Society.

What we aim to develop in our organization is more and more contacts. Numerous combinations are possible and opportunities to establish these contacts are unlimited. The work is interesting and remunerative to the extent that every member going out of his way to do some good for the organization advances that much in the esteem of his fellow-members and consequently in his association in the profession.

The organization is complex, and likely to be more so, but it is not necessary for a member to wait until he understands every phase of the work. That is an end which he may well seek but which is very difficult of realization. Sufficient is it to assist in the promotion of the welfare of the Society in any way possible—take the initiative and the result will come. The scheme of organization is after all secondary. What we need is people who do things.

COMMITTEES' ANNUAL REPORTS TO BE PRESENTED IN OCTOBER

The Secretary will soon call for the annual reports of committees which must be presented to the Council at its October meeting to be held on the 3rd in Cleveland, Ohio.

The year has been a particularly busy one for committees, both for the Standing Committees and for a number of Special Committees investigating and reporting upon timely subjects.

The Finance Committee has been particularly active this year, especially as the Society is still within the difficult period and all expenditures have to be watched very closely.

The Constitution and By-Laws Committee is another very busy committee and is likely to be for the next two years until the new Constitution, By-Laws and Rules are all adopted in their final form.

With the development of regional meetings the two committees on Local Sections and on Meetings and Program are finding additional points of contact, and the third committee on Professional Divisions is becoming closely related to both of these older committees. There is a special committee on Organization of Society Activities which is reporting particularly on the relations between these three.

There is also a special committee on Relations between Junior and Student Members, whose work, however, is being influenced by the actions of the Committee on Constitution and By-Laws.

L. P. ALFORD TO HEAD A SPECIAL COMMITTEE ON MEETING ACTIVITIES

To Clarify Relations Between Committees on Divisions, Meetings and Programs and Local Sections.

Since one of the fundamental activities of the new Professional Divisions is the securing, presentation and discussion of technical papers, there must naturally be developed very close relations between the committee in charge of this activity and the Committee on Meetings and Programs which has charge of the Annual and Spring conventions and also the Committee on Local Sections which is assisted by the Local Executive Committees throughout the country.

The Professional Divisions so far have endeavored to hold most of their meetings at the Annual or Spring Meetings, and the arrangement has been quite successful.

Assistance in the preparation of their programs has also been given by the Professional Divisions to the Local Sections. It has already been recounted in these columns how the Textile Division provided a professional program for a very successful meeting of the Providence Section, and also how such professional meetings have been satisfactorily conducted in New York City and in Newark, N. J.

Purpose of Committee

To clarify the relations between the three major committees in charge of these several activities the Council has appointed a new Special Committee entitled Committee on Relations between General Meetings, Professional Divisions and Local Sections. The personnel of this Committee consists of Messrs. L. P. Alford, W. B. Gregory, G. A. Orrok, D. S. Kimball, J. H. Herron, J. W. Roe and H. A. Reed.

Experience of Committee Members

Mr. Alford, as former member of the Committee on Aims and Organization, former vice-chairman of the Committee on Constitution and By-Laws, chairman of the Management Division, the largest in the Society, and now vice-president of the Society, is amply fitted by experience in the Society's work to head the new committee. Professor Gregory, former chairman of the New Orleans Section and now a manager of the Society, brings to the committee the experience with the Local Sections in the south. Mr. Orrok, chairman of the Publication and Papers Committee and responsible for the recent significant developments in the Society's publications, will be able to furnish able counsel upon the fundamental question of publication and distribution of the volumes of papers which the new activity will produce. Dean Kimball, one of the managers this year, has also seen much committee service. He was a member of the committee on Aims and Organization, chairman of the meetings and program committee, and is a delegate of the Society to American Engineering Council. Mr. Herron, chairman of the Cleveland Local Section and this year a member of the National Committee on Local Sections, will represent the viewpoint of the Local Sections in the Middle West. Mr. Roe, former member of the Publication and Papers Committee, and of the Meetings and Program Committee, was also former member of the Committee on Aims and Organization and chairman of the Sub-Committee on Internal Organization of the Society. Mr. Reed has not been associated directly with any of the three activities concerned and has been chosen more particularly to present unbiased views of them all.

THE 1921 YEAR BOOK

It is planned to issue the 1921 A.S.M.E. Year Book during December. The Secretary's office must be advised of any changes in address by September 1. Return post cards for this purpose will be sent to the membership during July.

This Year Book will include names of members whose applications are received prior to August 16 for action by the Council at its October meeting.

Recent Section Meetings

Atlanta. June 28. At Georgia School of Tech., Atlanta, Ga. Election of officers.

Birmingham. April 20. At Southern Club. Speakers: Ernest Hartford, Prof. W. H. Kenerson, and Charles Penrose.

Colorado (Denver). May 27. Election of officers.

Connecticut State:

Bridgeport. May 27. Subject: The New Epoch in Industry—That of Handling Materials by Mechanical Means, by G. C. Agry, Mgr., Industrial Information Dept., The Lamson Co.

Meriden. June 9. Election of officers. Demonstration of high-speed pipe cutting and threading. Fire extinguishing demonstration by means of latest automatic sprinkler devices and chemical extinguisher apparatus.

Inland Empire (Spokane, Wash.). June 17. Joint meeting with the engineering societies of Spokane.

Los Angeles. May 20. Joint annual meeting of the technical societies of Los Angeles: An Evening with the Movies; Censorship of the Movie, by Rupert Hughes, celebrated novelist of the Goldwyn Studios. Bob Wagner, artist and writer, also spoke.

June 17. Ladies night.

Ontario. May 13. Subject: Mechanical Processes in Mining and Metallurgy, by C. E. Macdonald, Sales Engineer, International Nickel Co. Talk illustrated with motion pictures and lantern slides.

New Orleans. May 9. Joint meeting with the Louisiana Engineering Society. Subject: Certain Features Relating to Hydraulic-Turoine Design and Settings, by E. W. Burbank, Sales Engineer, Allis-Chalmers Co.

Philadelphia. June 17. Joint meeting A.I.E.E. Illuminating Engineering Society and local section of A.S.M.E. Outing at Howard McCall Field. Golf, tennis and baseball.

Pittsburgh. April 26. Joint meeting with Engineering Society of Western Penn. Subject The Possibility of Improved Methods of Rolling Sheet Steel, by S. B. Ely.

Providence. May 17. Joint meeting with Providence Engineering Society. Subject: Listening Devices, by Prof. O. D. Kellogg, Harvard University, Cambridge, Mass.

St. Louis. June 2. Subject: Electrolytic Process of Manufacture of Chlorine Gas, by David Larkin, of Larkin & Pratt, Consulting Engineers.

Washington, D. C. June 9. Discussion of The Amalgamation of the Technical and Scientific Societies of Washington.

Worcester. May 11. The Making of High-Grade Papers, by Mr. Williamson, Executive Engineer, Strathmore Paper Co., Mittineague, Mass. The Expressive Qualities of Paper, by another representative of the same firm.

Student Branch Meetings

Alabama Polytechnic Institute. April 21. Mr. L. P. Alford addressed about four hundred engineering students on Some Unsolved Engineering Problems.

May 5. Election of officers.

Carnegie Institute of Technology. April 26. At this meeting the annual banquet was held, which ended the season's program. Election of officers was held for the coming year.

Drexel Institute. March 2. Mr. Leonard Kershaw gave a talk on the essentials to the young engineer in the drafting room.

April 4. Elimination of Grade Crossing, by Mr. Wagner.

May 6. Professor Dawson Dowell gave an interesting talk on Steam Locomotives.

University of Illinois. May. Talks were given by students on Manufacture and Use of Ball Bearings, and Variable-Pitch Aeroplane Propellers.

PRESIDENT CARMAN AND THE A S M E STUDENT BRANCH AT LELAND STANFORD JR. UNIVERSITY

Photograph taken on the occasion of Mr. Carman's visit to the University in February. After luncheon and inspection of the engineering laboratories, President Carman addressed the Student Branch of the University on The Engineer and His Opportunity.

Iowa State College of Agriculture and Mechanic Arts. April 6. Illustrated lecture by F. I. Ferguson of Frank D. Chase Company on the Modern Foundry, Its Design, Equipment and Operation.

April 20. Lecture by Mr. Stewart of Johns-Manville Company on Methods of Conserving Coal by Using Asbestos Products.

University of Kansas. May 12. Coefficient of Ignorance by Professor John A. Dent. Election of officers for 1921–22.

Lehigh University. May. At the final meeting of the Student Branch for the year, officers were elected for the year 1921–22.

University of Michigan. April 8. Election of officers.

Oregon Agricultural College. May 13. Election of officers. Advantages of the A.S.M.E. explained by Professors Martin and Graf.

Ohio State University. May 27. Exhibition of the equipment, machinery and apparatus in the laboratory. Most of the machinery was in operation. This proved to be one of the most successful affairs of the season, due to the fact that there was an attendance of from 8000 to 10,000 people.

University of Oklahoma. May 19. The last meting of the year proved to be very interesting. There was a talk on the Manufacture of Glass, by Mr. Morrow. The variable air screw was taken up in detail by Mr. Childers. Officers were elected for next year.

Tufts College. April. Mr. Moses of the Edison Electrical Illumination Company gave a very interesting talk on Welfare Work.

May 9. At the last meeting of the year a lecture was given by C. A. Marston, vice-president and general manager of the Ajax Motors Corporation. He spoke on Manufacturing Methods of a Modern Automobile Plant.

Worcester Polytechnic Institute. April 3. The Problems and Experiences Incidental to the Supervision of the Morgan Construction Drafting Room, by Edward J. Quinn, chief draftsman, Morgan Construction Company, Worcester, Mass.

Yale University. May 16. Election of officers for school year 1921–22.

Personals

H. V. COES has been appointed manager of a branch office of Ford, Bacon & Davis recently opened in Philadelphia, Pa.

JOHN J. SWAN has resigned his position with the Prest-O-Lite Company, Indianapolis, Ind., to become associated with the Engineering Business Exchange of New York City.

JOHN W. MORTON, formerly with the Hooven, Owens, Rentschler Company, Hamilton, Ohio, as engineer in charge of the Diesel Department, is now connected with the New York Shipbuilding Corporation, Camden, N. J.

FIRMO BERCETCHE, JR., formerly employed by the Union Oil Company of California, has accepted a position as mechanical engineer for the Argentine Government. He will assist in the development of the petroleum fields of Comodoro Rivadavia.

G. A. BINZ has resigned as New York manager of Yarnall-Waring Company to become assistant sales manager with the American Steam Gauge & Valve Mfg. Co., Boston, Mass.

A. C. BULLEN, formerly with the Holly Sugar Company, Huntington Beach, Cal., is now a director of the Mexican American Sugar Corporation, Los Angeles, Cal.

WHITLEY B MOORE has been transferred from the Canton, Ohio, to the San Francisco office of The Timken Roller Bearing Company.

C. H. MOUNT, formerly sales engineer for The Jeffrey Mfg. Co., Cleveland, Ohio, has accepted a similar position with The Stearns Conveyor Company of Cleveland.

W. A. CAREW is superintending engineer for Row & Davis Engineers, Inc., New York City. He was formerly general superintendent for the Morgan Engineering Company, Jersey City, N. J.

EDMUND S. GLAUCH has recently opened an office as mechanical engineer in Harrisburg, Pa. He was formerly assistant mechanical engineer for the Harrisburg Foundry and Machine Works of Harrisburg.

R. K. STOCKWELL, who until recently was general sales manager of the Robins Conveying Belt Company, New York City, has been appointed British engineering manager for that company and has taken up headquarters in London.

CHARLES W. HUGHES, formerly located in South Norwalk, Conn. with the Norwalk Iron Works Company, is now with the Dixie Engineering & Insulating Co. of Atlanta, Ga., a sales organization of the Norwalk Iron Works Company.

FORREST M. TITUS is representative in the Far East for the American Locomotive Sales Corporation. He is located in Peking, China. A. I. LIPETZ, European representative for this corporation, has headquarters at Paris.

W. S. BURKE has been appointed eastern manager of the Green Engineering Company and will be in charge of the eastern office in New York City.

Coming Section Meetings

Great Lakes Regional Meeting. October 3 and 4. Headquarters at Hotel Winton, Cleveland, Ohio, in the rooms of the Cleveland Engineering Society. Local sections and engineering clubs in the following cities have been invited to participate in this meeting: Akron, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Detroit, Erie, Rochester, Toledo, Indianapolis, Ontario, Pittsburgh and the Engineering Society of Dayton. This meeting includes inspection trips and speakers and terminates with a banquet at the Hotel Winton. Addresses on Grinding and Measuring Involute Gear Teeth by E. J. Lees, president Lees Bradner, Co., Cleveland, Ohio; and The St. Lawrence River Project, by Hugh L. Cooper, consulting engineer, New York City.

Regional Meeting at Kansas City. November 4 and 5. The headquarters will be in Kansas City with the St. Louis, Tri-Cities and Mid-Continent Sections participating. The Council has approved the formation of a new section at Kansas City and they are planning to hold a meeting similar to the engineering and chemical congress held in April by the Mid-Continent Section. This will probably be held also on November 4 and 5.

Mid-Continent. (*Tulsa, Okla.*) Weekly luncheons at Tea Cup Inn, Tulsa, every Friday noon.

San Francisco. Weekly luncheons at the Engineers' Club every Thursday noon.

W. L. BAGBY, formerly assistant superintendent of pipe lines for the Shell Company of California, is now employed in a similar capacity with the Cia de Petroleo "La Corona," S.A., a subsidiary company of the Royal Dutch Shell. He is located at Tampico, Mexico.

H. M. DOUGHERTY of the Chile Exploration Company is now representing that company in Chuquicamata, Chile.

T. G. LANEY, formerly with the Pierce Oil Company, Fort Worth, Tex., is now with the Mystic Gasoline Company, Breckenridge, Tex.

M. R. MELDRUM is president of the newly formed corporation of Herbert Norris, Inc., Buffalo, N. Y.

SLOAN S. SHERRILL, formerly mechanical engineer for the Chemical Construction Company, is now employed in the same capacity by the Calumet Baking Powder Company, Joliet, Ill.

E. A. HAMILTON, formerly president of Fernhaut, Hamilton & Freygang, Inc., New York City, is now general sales manager of The Gardner Governor Company, Quincy, Ill.

G. E. TUCKERMAN has resigned his position as mechanical engineer with The Ballinger Company and is connected with the Central Construction and Supply Co., Philadelphia, Pa., as sales engineer.

HARTLEY ROWE, formerly manager of the Detroit office of Lockwood, Greene & Co., Engineers, has been appointed district manager of the Boston office, succeeding KENNETH MOLLER, who was recently elected into the firm. W. F. CROSBY, of the same company, is now located in Paris.

N. K. ALTHOUSE is now a member of the New York sales force of the Homestead Valve Manufacturing, Homestead, Pa.

C. W. KOINER, for the last thirteen years general manager of the Municipal light plant of Pasadena and for the last year also city controller, has been appointed the first city manager of Pasadena, which has recently adopted this form of government.

MILLARD C. ERNSBERGER, professor of mechanical engineering in the University of Rochester, has been appointed professor of power engineering in the Sibley College of Mechanical Engineering at Cornell University.

FRANKLIN G. HUBBARD, formerly master mechanic of the Western Electric Company of Chicago and more recently associated with the H. E. Harris Engineering Company and Hubbard & Harris, consulting engineers of Bridgeport, Conn., is now president and mechanical engineer of The Lacey Mfg. Co., Bridgeport, which makes a specialty of die and tool work.

HERBERT SOUTHERN has severed his connection with Steel, Peech & Tozer, Ltd., Sheffield, England, and is now assistant general manager of Messrs. G. P. Wincott, Ltd., engineers and furnace builders of Sheffield.

FRANK SAWFORD, formerly chief engineer of the Taylor Engineering Company, Ltd., Vancouver, B. C., has opened an office in Vancouver as consulting and constructing mechanical and electrical engineer, specializing in industrial power plants.

ALBERT J. ALBRECHT, formerly draftsman in the artillery drawing room of Midvale Steel & Ordnance Company, is now draftsman in the engine drawing room of Wm. Cramp & Sons Ship & Eng. Bldg. Co., Philadelphia, Pa.

HARRY E. KARCHER is now with the Federal Creosoting Company of Livingston Manor, N. Y. He was formerly with the Canada Creosoting Company, Ltd., of Trenton, Ontario, Canada.

C. H. MCCLINTOCK, formerly construction engineer for the Trinidad Elec. Trans. Ry. & Gas Co., Trinidad, Colo., is now mechanical engineer for the Denver Tramway Company.

EDWARD D. FINN announces that he has dissolved partnership of the A. J. McLean Company and is now engaged in building construction under his own firm name in Detroit, Mich.

C. R. BURT, until recently with the Davenport Machine Tool Company, Rochester, N. Y., is new president and general manager of the New Process Gear Corporation, Syracuse.

H. O. FULSON, who is connected with the American Cotton Oil Company, has been transferred from Columbia, S. C. to Memphis, Tenn.

PAUL H. TAYLOR, formerly plant engineer for Bird & Son, Inc., East Walpole, Mass., is now with the Mason & Hamlin Co., Boston, Mass.

F. H. BALLOU, who for the past year has been in the general offices of The Amalgamated Sugar Company, Ogden, Utah, is now at the McCahan Refinery, Philadelphia, Pa.

I. A. BAUM announces that the La Salle Engineering Company of Chicago has been reorganized under the name of Boyer, Baum and Company and that offices have been established at St. Louis, Mo., for the practice of consulting engineering, in connection with structural steel, reinforced concrete and timber structures.

D. VAUGHN WATERS, formerly assistant to chief engineer, Ivers-Lee Co., Newark, N. J. is now mechanical engineer with Gould & Eberhardt, Irvington, N. J.

JACOB H. REITZEL, who until recently was with the Crocker-Wheeler Company, Ampere, N. J., is now manager of The Reliable Products Company, New York, N. Y.

H. R. PAUSIN is president and mechanical engineer of the recently incorporated firm of Pausin Engineering Company, Newark, N. J.

M. JAEGER is now chief designer and mechanical engineer for the Anchor Cap and Closure Corporation, Long Island City, L. I., N. Y.

J. B. CRANE, formerly with the Binghamton, N. Y. Light, Heat & Power Co. as construction superintendent, has become associated with the George T. Ladd Company of Pittsburgh, Pa.

H. E. KAIGHN has severed his connection with the Wilmington Sugar Refining interests, except in a consulting capacity, and has resumed active practice as a consulting engineer, with offices in Wilmington, Del.

WARREN F. KENDRICK has left the employ of the Ford Motor Company as designing engineer to become sales engineer for The Griscom-Russell Company, Chicago, Ill.

E. S. JONES, formerly assistant engineer for the Pacific Gas & Electric Co., Sacramento, Cal., is now engineer for the Honolulu Gas Co., Ltd., Honolulu, T. H.

J. E. TAYLOR, who during the past five years has been located with The Superheater Company, New York, as mechanical and erecting engineer, is now with the Service Department of the Simmons-Boardman Publishing Company, New York.

The Engineering Department of The American Agricultural Chemical Company, with which ANTHONY B. ARNOLD and CARL RIGDON are connected, has been removed from Elizabeth, N.J., to New York City.

D. B. MORRIS, of The Morris Company, Georgetown, S. C., announces that he is now erecting and will operate a twenty-ton ice plant in that city.

R. F. HETZEL has left the engineering department of the Ford Instrument Company, New York N. Y., to become chief engineer and assistant to the general manager of the Goetze Gasket and Packing Co. of New Brunswick, N. J.

ASA M. MATTICE, formerly with the Remington Arms Union Metallic Cartridge Company, New York City, is now advisory engineer for the Remington Arms Company, Inc., New York City.

JOSEPH W. ROE has been appointed professor of industrial engineering at New York University.

CHARLES S. GLADDEN, formerly with the Du Pont Engineering Company, Detroit, Mich., is now with the General Motors Corporation, in that city.

J. L. DRAKE is now with the Owens Bottle Company, Toledo, Ohio. He was formerly with the Defiance Machine Works, Defiance, Ohio.

CARL KRAFT, formerly with the Murphy Door Bed Company, New York, is now with The Duplex Engine Governor Co., Inc., Brooklyn, N. Y.

J. H. MCNALLY, formerly with Weston Dodson & Co., Inc., Bethlehem, Pa., is now vice-president and fuel engineer of the Fuel Service Company, New York, N. Y.

W. L. NEFF, formerly with Brown & Sharpe Mfg. Co., New York, is now New York representative of the Davenport Machine Tool Co., Inc., Rochester, N. Y.

F. KARL SCHNEIDER has severed his connection with the Krebs Pigment and Chemical Company of Newport, Del., and has purchased the plant and equipment of the Albion Engineering Company of Philadelphia, operating it as a general engineering and machine shop.

C. W. FRANCIS has been elected vice-president of the Gillespie Eden Corporation, of Paterson, N. J. He was formerly general superintendent of the Electric Motor Plant of this corporation.

WALTER C. STRUNK has resigned his position with the mechanical research and constructoin division of the motive power department of the Interborough Rapid Transit Company, New York City, to become associated with the stoker division of the Westinghouse Electric & Mfg. Co., Lester, Pa.

P. C. OSTERMAN, superintendent of the American Gas Furnace Company, announces that the entire personnel will henceforth be concentrated in a main office in Elizabeth, N. J.

D. M. FERRIS, formerly with Wells & Newton Company of New York City, is now doing some special work at the U. S. Bureau of Mines in connection with the production of helium gas for the use of the War Department.

GEORGE H. KENDALL is now with the Jefferies-Norton Corporation of Worcester, Mass. He was formerly in the Standards Department of the Norton Company of Worcester.

HENRY RODEMEYER has resigned from the Cook Spring Company of New York and Ann Arbor, Mich., and accepted a position as superintendent of the Geo. A. Hebb Spring Co. of Newark, N. J.

H. M. RUGG is now with the Michigan State Auto School, Detroit, Mich., as director of Educational Extension.

H. B. JERNEE, formerly with the Buick Motor Company, Flint, Mich., is now connected with the Oakland Motor Car Company, Pontiac, Mich.

B. M. W. HANSON is now president of the Hanson-Whitney Machine Company, Hartford, Conn. He was previously vice-president and general manager of Colt's Patent Fire Arms Mfg. Co.

LOUIS S. BENJAMIN, until recently with the Atlantic Sugar Refineries, Ltd., St. John, New Brunswick, is now with the Guantanamo Sugar Company, Guantanamo, Cuba.

Necrology[1]

FRANK D. BAKER, for 20 years chief engineer of the Colorado department of the American Smelting & Refining Co., died in Denver on April 29 1921. Mr. Baker was born in March 1858 in Wilmington, Ill. He was graduated in 1888 as a mechanical engineer from the University of Illinois. During his long service with the Smelter company he was in charge of or intimately connected with much of the metallurgical plant construction in the State and was widely known and admired by western metallurgical and mechanical engineers. He was the inventor of numerous metallurgical devices of which the best known is the Baker cooler for cooling calcined materials on a large scale. Mr. Baker became a member of the Society in 1893.

GEORGE H. BARBOUR, mechanical and structural engineer of Pittsburgh, Pa., died on April 19, 1921. Mr. Barbour was born in Allegheny, Pa., on March 3, 1867. He was graduated from the Western University of Pennsylvania, now the University of Pittsburgh, as a civil engineer in 1887, one of a class of six. From 1901 to 1917 Mr. Barbour was associated with the U. S. Steel Corporation. Later he was with the Dravo Construction Co. and during the war period he was connected with the Fawcus Machine Co.

[1] For details of the professional careers of deceased members see Necrology Section of the forthcoming issue of the Transactions of the Society.

Mr. Barbour became a member of the Society in 1912.

Benjamin S. Eddy, junior member of the Society since 1917, died on February 19, 1921. Mr. Eddy was born on March 10, 1892, in Indianapolis, Ind. He was educated in the schools of that city and Purdue University, from which he received his B.S. in 1914. He served overseas during the War as a first lieutenant in the Engineers' Corps. He was gassed while in charge of a dredging project at Donges, the effects of which later caused his death. Before entering the service Mr. Eddy had his own business in Indianapolis as a heating and ventilating contractor and engineer.

Samuel S. Jordan, naval architect and engineer, died on January 5, 1921 in Scarboro, Me. Mr. Jordan was born in Cape Elizabeth, Me. on June 26, 1862. He was graduated from Worcester Polytechnic Institute. Mr. Jordan was for a number of years in charge of the engine work and drafting in the shipyard of John Roach, Philadelphia. He was also assistant superintendent in the shipyard at Newport News, Va., and later superintendent of the Quintard Iron Works, New York City. For the past fifteen years he had been managing the family estate in Scarboro. He became a member of the Society in 1887.

James I. Milliken, since 1895 agent of the Everett Mills, Lawrence, Mass., died on April 19, 1921 at his home in that city. Mr. Milliken was born on March 9, 1850, in Saco, Me. He received his early education in the public schools and Monson Academy, Monson, Mass. Mr. Milliken was engaged in the cotton-mill business from his youth and was widely known as an exceptionally able manufacturer. He belonged to the Masonic Fraternity, the Chamber of Commerce, the National Association of Cotton Manufacturers and to a number of other fraternal and social organizations and clubs. Mr. Milliken became a member of the Society in 1917.

Stanley H. Moore, formerly director of the mechanical arts department, McKinley High School, St. Louis, Mo., died in Los Angeles, Cal. on January 15, 1921. Mr. Moore was born in St. Louis, Mo. on November 29, 1874. He was educated in the public schools and Washington University of that city. For a number of years he served as director of manual training in the Manual Training High School of Kansas City, Mo. He was the author of a book on Mechanical Engineering and Machine-Shop Practice which is widely used both in shops and universities. Mr. Moore became a junior member of the Society in 1900 and an associate in 1903. He was also a member of the American Institute of Electrical Engineers, the Society for the Promotion of Engineering Education and the National Educational Association.

William E. Ninde, associate professor of mechanical engineering in the College of Applied Science, Syracuse University, died on February 20. Professor Ninde was born in Rome, N. Y. on December 3, 1865. During his professional career he was connected with the American Locomotive Co., the McIntosh & Seymour Co., the Compressed Air Co. of New York, the Bass Foundry & Machine Co. and the Solvay Process Co. In 1914 he received from Syracuse University the honorary degree of mechanical engineer. He became a junior member of the Society in 1899 and a member in 1903.

Hugo B. Roelker, a member of the Society since 1889, died in Port Orange, Fla., on April 18, 1921. Mr. Roelker was born in Osnabruck, Germany, on September 19, 1843. He obtained his education in technical schools of Germany. He came to this country in 1861 and was employed as draftsman in the DeLamater Iron Works, New York City. In 1883 he became superintendent. Upon the closing of the Works, he opened an office in Maiden Lane, doing a general mechanical and marine engineering practice. Mr. Roelker was a member of the Arion, Liederkranz, Columbia Yacht and Engineers' Clubs.

Adolph Sorge, Jr., for twenty-five years general western representative of the Harrison Safety Boiler Works, now known as the H.S.B.W.-Cochrane Corporation, died suddenly on May 5, 1921, in Chicago. Mr. Sorge was born in Hoboken, N.J. on September 28, 1857. He was graduated from Stevens Institute of Technology as a mechanical engineer in 1875. Mr. Sorge was formerly general manager of the Wood-Mosaic Co., Rochester, and also acted as advisor to Selden in framing the claims of the famous automobile patent subsequently issued to the latter. Mr. Sorge became a member of the Society in 1886. He was also a member of the Western Society of Engineers, the American Foundrymen's Association, the Engineers' Clubs of New York and Chicago and the Technology Club of Chicago.

Alfonso R. J. Wiedmann of the engineering department of the *World*, New York City, died on April 17, 1921. Mr. Wiedmann was born in New York City on October 28, 1897. He was graduated from the Polytechnic Institute of Brooklyn in 1919, receiving his M.E. degree. He was first associated with the Plant Engineering Equipment Co. and subsequently with the *World*, until his death. He became a junior member of the Society in 1919.

Preston K. Yates, consulting engineer, New York City, died on April 22, 1921 in Albany, N. Y. Mr. Yates was born in Canajoharie, N. Y. in 1856. He was graduated from Rensselaer Polytechnic Institute in 1880. Mr. Yates made a specialty of designing and erecting stone-crushing plants. At the time of his death he had just completed a plant for the highway commission of the State of Georgia. Mr. Yates was a member of the American Society of Civil Engineers, the Ohio Society, the Alumni Association of Rensselaer and the Republican Club of Brooklyn. He became a member of the Society in 1914.

New Members of the Society

The following is a list of those who have qualified for membership in the Society between the dates of March 26 and June 1. The grade is indicated by the symbol after the name; i.e., M-Member; A-Associate; AM-Associate-Member; J-Junior.

ADMIRE, Amiz O.—J, Indianapolis, Ind.
ALDRICH, Leo S.—J, Elmira, N. Y.
ALLEN, Thomas M.—AM, New York, N. Y.
ALTHEN, Geo. R.—M, Baltimore, Md.
ANDERSON, F. Arthur—AM, Milton, Wis.
ANDERSON, Orvar F.—A, Hartford, Conn.
ANDREW, Frederick W.—M, Brooklyn, N. Y.
APPLETON, Harry W.—AM, West Springfield, Mass.
ARKEBAUER, Jesse O.—M, New York, N. Y.

BANGHART, Lee E.—J, Battle Creek, Mich.
BEEBE, Harold N.—J, Williamstown, Mass.
BEHR, Harry C. A.—AM, Belmont, N. Y.
BEKKER, John A.—AM, Passaic, N. J.
BENKLIDES, Gabriel N.—J, Brooklyn, N. Y.
BILGER, John Norman—J, Nicetown, Phila., Pa.
BITNER, Laurence S.—A, Boston, Mass.
BLABON, Orin F.—J, Los Angeles, Cal.
BLACK, Archibald—M, Washington, D. C.
BLAKESLEE, Doraf W.—M, Pittsburgh, Pa.
BORGSTROM, Chester—J, Chicago, Ill.
BOYNTON, Augustus S.—M, Meriden, Conn.
BRIGGS, Arthur P.—AM, Columbia, S. A.
BRISTOL, Bernard R.—M, New York, N. Y.
BROBACK, J. Irvin—J, Milwaukee, Wis.
BRONSON, George E.—AM, Beacon Falls, Conn.
BROOTZKOOS, Sergius—AM, Brooklyn, N. Y.
BROWN, C. L.—AM, Tulsa, Okla.
BRUSH, Peter F.—AM, St. Louis, Mo.
BRYANT, Frederick C.—J, New York, N. Y.
BYRNE, Louis W.—AM, New York, N. Y.

CAMPBELL, Vernon A.—AM, Boston, Mass.
CANFIELD, George W.—AM, Newark, N. J.
CHICK, Alton Charles—AM, Providence, R. I.
CHURCHILL, F. Anson—AM, Chicago, Ill.
CLARKE, Bertrand R.—M, New York, N. Y.
CORFF, Edward V.—AM, Chicago, Ill.
CORYELL, William C.—M, Youngstown, Ohio.
COTTON, Edwin R.—J, Lynn, Mass.
COYLE, John H.—J, Hartford, Conn.
CRANEHEAD, Ralph C.—J, New York, N. Y.
CULLETON, Leo G.—AM, Milan, Italy.
CUNNINGHAM, George F.—J, Shreveport, La.
CUTMORE, Charles M.—AM, New York, N. Y.

DAVENPORT, Frank B.—AM, New York, N. Y.
DeLUKACSEVICS, Charles M.—M, New York, N. Y.
DOLE, Charles E.—M, Seattle, Wash.
DUGAN, John A.—AM, Washington, D. C.
DUNCAN, George W.—M, Wilmington, Del.
DUNCAN, William Y., Jr.—AM, Conshohocken, Pa.

EGGERT, Louis H.—J, New York, N. Y.
ELLMAN, Louis—AM, Chicago, Ill.
ELWELL, Lloyd E.—M, Los Angeles, Cal.
EMERY, Albert Hamilton, Jr.—M, Glenbrook, Conn.
EMERY, James R.—AM, Toledo, O.
ENGSTROM, Thor—AM, Pittsburgh, Pa.
ESPY, William N.—AM, Charleroi, Pa.

FRANCIS, Tench—J, Pelham, N. Y.
FRANKEL, Gilbert—J, Buffalo, N. Y.
FREEBORN, Faun Wm.—M, Tulsa, Okla.
FOSS, Fedor F.—M, Washington, D. C.

GEORGE, Stephen A.—J, Waterbury, Conn.
GODSHALK, E. L.—J, Norristown, Pa.
GOLDREYER, John—J, Bronx, New York, N. Y.
GORBEA, Manuel I.—AM, New York, N. Y.
GRAVES, John L.—J, Boston, Mass.
GREENE, Chas. T.—AM, Brooklyn, N. Y.
GREENLEAF, C. T.—AM, Boston, Mass.

HAENSELER, Henry A.—AM, New York, N. Y.
HAGER, J. Fred—AM, St. Louis, Mo.
HAMILTON, J. Earle—AM, Housatonic, Mass.
HAMMOND, Paul H.—AM, New York, N. Y.
HANCE, James—AM, Newark, N. J.
HARDING, Percival N.—AM, New York, N. Y.
HARDY, Simeon J.—AM, Minneapolis, Minn.
HARGER, Frederick D.—AM, New York, N. Y.
HARRINGTON, Edward L.—AM, Erie, Pa.
HAYDOCK, John, Jr.—J, Plainfield, N. J.
HEIL, William—AM, West Orange, N. J.
HELMRICH, George B.—AM, Norman, Okla.
HIDDLESON, William A.—A, Bristol, Tenn.
HIGGINSON, Thomas H.—M, Montreal, Que., Can.
HITCHEN, Maurice—M, Detroit, Mich.
HOLDEN, J. Newton—AM, Oakland, Cal.
HOLLWITZ, Ludwig A.—AM, L. I. City, N. Y.
HOPKINS, Edward W.—J, Springfield, Mass.
HOPKINS, Spencer D.—AM, Cincinnati, Ohio.
HUGHES, Earl C.—AM, Worcester, Mass.
HUGLE, Herman—AM, Beloit, Wis.
HUTTON, Robt. G.—A, Jersey City, N. J.

ISAKSEN, Robert C.—AM, Brooklyn, N. Y.

JACKSON, George P.—AM, New York, N. Y.
JAEGER, M.—M, L. I. City, N. Y.
JAKUBOWSKI, Stanley A.—J, Chicago, Ill.
JANNSEN, Ernest—AM, New York, N. Y.
JOHNSON, Clark C.—AM, Vernon, Cal.
JOHNSON, Joseph B.—M, Clarkdale, Ariz.

KANTROWITZ, M. W.—AM, Brooklyn, N. Y.
KIMBLE, Earl C.—AM, Portsmouth, N. H.
KLOTZ, August H.—M, Sandusky, Ohio.
KOCH, Charles E.—AM, Chicago, Ill.
KRULL, Leonard M.—AM, Worcester, Mass.

LAMBERT, Joseph L.—J, Cicero, Ill.
LANDELL, John A. B.—AM, New York, N. Y.
LAPKIN, John D.—AM, Brooklyn, N. Y.
LARKIN, David—M, St. Louis, Mo.
LAYCOCK, Arthur M.—M, Wilkes-Barre, Pa.
LEE, Randolph H.—J, Newport News, Va.
LEVIN, Vladimir Z.—AM, Paterson, N. J.
LEWIS, Frank S.—M, Syracuse, N. Y.
LICHTY, Lester C.—AM, Norman, Okla.
LIFNER, Eric J.—M, E. Cambridge, Mass.
LIMONT, Alex W.—M, Hastings-On-Hudson, N.Y.
LINCOLN, Willis C.—M, New York, N. Y.

McCALL, Donald G.—AM, Bethlehem, Pa.
McCARTHY, John W.—J, St. Louis, Mo.
McCROSKY, Donald W.—J, Bridgeport, Conn.
McELROY, Peter S.—AM, Detroit, Mich.
McFADDEN, Benjamin C.—M, Pittsburgh, Pa.
McMAHON, John F.—M, New York, N. Y.
MACINTYRE, Alex. F.—M, Atlanta, Ga.
MARSHALL, William—M, Baltimore, Md.
MASCALL, Ernest—AM, Trinidad, B. W. I.
MAULL, William R.—AM, Philadelphia, Pa.
MAYER, Carl F.—J, Cleveland, Ohio.
MEDCALF, Duncan M.—M, Toronto, Ont., Can.
MEROVITCH, Eugene B.—M, Chicago, Ill.
MILLER, Earl J.—M, Bethlehem, Pa.
MILLER, Louis—J, Brooklyn, N. Y.
MILLER, Michael E.—M, Washington, D. C.
MOODIE, William C.—J, Waterbury, Conn.
MORAN, John W.—M, Fall River, Mass.

MOREHOUSE, JOHN A.—AM, Boston, Mass.
MOSSMAN, JOS. B.—M, Salt Lake City, Utah.
MULET, LORENZO M.—AM, Santa Domingo, R. D.

NAFTALI, ISADORE—J, Elizabeth, N. J.
NAGLE, RAYMOND J.—AM, Scranton, Pa.
NONAKA, HIDEJI—AM, New York, N. Y.
NORTON, KENRICK M.—AM, Boston, Mass.

OATES, FRANK R.—AM, New York, N. Y.
OKA, MASAKAZU—AM, Marunouchi, Tokio, Japan.
OSLER, H. FRANK—AM, Springfield, Mass.
OXFORD, CARL J.—AM, Detroit, Mich.

PAVEY, WILLIAM B.—M, Chicago, Ill.
PETERS, FRED C.—AM, Paterson, N. J.
POLIAKOFF, ROUVIME—M, New York, N. Y.
POLLARD, EDWARD V.—J, Lynn, Mass.
POOLE, ARTHUR F.—M, New York, N. Y.
PRIMEAU, BRUNO C.—AM, Sault Ste. Marie, Mich.
PROKOFIEFF, IVAN M.—M, New York, N. Y.

QUINN, WILLIAM R.—AM, New York, N. Y.

RAWSON, LESLIE A.—J, El Segundo, Cal.
RAYMOND, JOSEPH F.—AM, New Haven, Conn.
REIFEISS, EMIL F.—J, St. Louis, Mo.
REIMER, CLARENCE C.—AM, Rogers, Mich.
REMNITZ, ALBERT W.—AM, Los Angeles, Cal.
RENNO, PAUL C.—AM, New York, N. Y.
RICHARDSON, ROGER F.—M, Birmingham, Ala.
RICHTER, LUZON W.—J, L. I. City, L. I., N. Y.
ROBERT, JAMES, M.—M, New Orleans, La.
ROBINSON, WARREN A.—J, Cambridge, Mass.
ROBY, SHELDON S.—J, New Britain, Conn.
ROCKART, EDWARD R.—J, St. Paul, Minn.
ROCKETT, HAROLD C.—J, New York, N. Y.
ROCKWOOD, HARRY J.—M, E. Cambridge, Mass.
ROGERS, JAMES J.—AM, Meriden, Conn.
RONAY, BELA—AM, Jersey City, N. J.
ROSE, HENRY E.—AM, Springdale, Conn.
ROSECRANS, CRANDALL Z.—J, Urbana, Ill.
ROSSNAGEL, W. ELWOOD—J, New York, N. Y.
RUIZ, OSCAR H.—J, New York, N. Y.

SALBADOR, HUGH W.—M, New York, N. Y.
SAMS, FRED V.—AM, Seattle, Wash.
SAWAMURA, NOBUE—J, New York, N. Y.
SCHACHT, GEORGE E.—J, New York, N. Y.
SCHAUER, H. A.—AM, Milauwkee, Wis.
SCHNABEL, FERDINAND—A, New York, N. Y.
SCHUBERT, WILLIAM E.—J, Iroquois Falls, Ont., Can.
SCHWEIKERT, JOHN N.—AM, Toledo, Ohio.
SEELIG, ALFRED E.—M, New York, N. Y.
SERGEANT, CHARLES H.—Life-Member, Bradford, Pa.
SHANNON, JAMES F.—AM, New York, N. Y.
SHATANOFF, ROBERT—J, Brooklyn, N. Y.
SHAW, CHARLES H.—J, Holyoke, Mass.
SHAW, WM. C.—M, Portland, Oregon.
SHEA, JOHN J.—AM, New Britain, Conn.
SHERMAN, M. C.—M, Philadelphia, Pa.
SIBOLE, BARTON P.—AM, Tulsa, Okla.
SIMONS, SAMUEL S.—J, New York, N. Y.
SKILLIN, CLIFFORD A.—J, Boston, Mass.
SMARLING, CARL A.—AM, Brooklyn, N. Y.
SMITH, DAVID W.—AM, Mishawaka, Ind.
SMITH, HAROLD B.—J, Wilmington, N. C.
SMITH, SETH G.—J, Hartford, Conn.
SNOWDEN, HOWARD J.—M, Havana, Cuba.
SNYDER, JAMES H.—J, Rochester, N. Y.
SOLIS, OCTAVIO—AM, Cienfuegos, Cuba.
SOMMER, H. G.—J, Lansing, Mich.
SOPER, ROBERT H.—AM, Havana, Cuba.
SPARER, JOHN—J, Passaic, N. J.
SPAUNBERG, HARVEY L.—J, Bristol, Conn.
SPELT, GEORGE S., JR.—AM, Philadelphia, Pa.
SPRAGUE, Oscar V.—AM, Rochester, N. Y.
STEARNS, WILBUR A.—M, Lowell, Mass.
STEFFA, HOMER I.—M, Chicago, Ill.
STEINICKE, FRANK H.—AM, New York, N. Y.
STEINS, C. K.—AM, New York, N. Y.
STEVENSON, WILFRED C.—M, San Francisco, Cal.
STEWART, BURNS A.—AM, Chicago, Ill.
STIRLING, NORMAN W.—AM, Jersey City, N. J.
STRICKLER, EDWIN C.—J, New York, N. Y.
STRIECHER, IRVING H.—J, Chicago, Ill.
STURGES, HARRY A.—AM, Natick, Mass.
SUTER, FRANK F.—AM, Bloomfield, N. J.
SVENSSON, VICTOR A.—AM, New York, N. Y.
SVILDO, IVAN A.—J, Orange, N. J.

TALBOTT, NELSON S.—J, Dayton, Ohio.
TAYLOR, GEORGE A.—AM, Greenville, S. C.
TERRY, ROGER V.—J, Newport News, Va.
THOMAS, LOUIS G. L.—J, Chicago, Ill.
THOMPSON, CHAS. S.—AM, Chicago, Ill.
THOMSON, GEORGE H.—AM, New York, N. Y.
THOMSON, WILLIAM E.—AM, Los Angeles, Cal.
THUERMANN, WILFRED J.—J, Milwaukee, Wis.
TIETJEN, OTTO F.—J, Cleveland, O.
TODD, WILLIAM N.—AM, Portland, Me.
TORGERSON, ALFRED C.—AM, Anaconda, Mont.
TORREY, THEODORE—AM, Amesbury, Mass.
TOWNSEND, JOHN—J, Canton, Ohio.
TYLER, WILLIAM C.—M, Hoopeston, Ill.

VAIL, HAROLD P.—AM, Los Angeles, Cal.
VAN DEUSEN, EDWARD T.—J, Burbank, Cal.
VAN HOOK, CHAS. F.—J, Paterson, N. J.
VINOGRADOFF, DEMETRY I.—M, Brooklyn, N. Y.
VOGEL, WILLIAM J.—J, Bayonne, N. J.

WAHLSTROM, OSCAR—J, New York, N. Y.
WALL, ALBERT G., JR.—J, St. Louis, Mo.
WALSH, THOMAS MARTIN—J, Newark, N. J.
WALSTAD, ADOLPH N.—M, Tacoma, Wash.
WALTON, EDWARD N.—AM, Cleveland, Ohio.
WARD, SAMUEL E.—M, Atlanta, Ga.
WATLING, FOSTER E.—AM, Bloomfield, N. J.
WEAVER, EDWARD C.—AM, Seymour, Conn.
WEAVER, JAMES R.—J, East Pittsburgh, Pa.
WEBBER, EATON—J, Atlanta, Ga.
WELLS, HARRY N.—J, New York, N. Y.
WENDT, EDGAR F.—M, Buffalo, N. Y.
WERTZ, AUSTIN L.—AM, Dubuque, Iowa.
WEST, DONALD A.—J, Johnstown, Pa.
WEST, PERRY—M, New York, N. Y.
WESTON, GEORGE F.—M, River Mines, Mo.
WETHERBEE, ASHUR U.—M, Evanston, Ill.
WETHERILL, WAYNE—M, Philadelphia, Pa.
WHITE, DEGRAY—J, Plainfield, N. J.
WHITE, ELWOOD S.—M, New York, N. Y.
WHITE, WILLIAM K.—A, Rochester, N. Y.
WIDGER, THURLOW S.—AM, Boston, Mass.
WIGGINS, BENN—AM, Bloomfield, N. J.
WILHELM, FREDERICK—AM, Brooklyn, N. Y.
WILKES, GERALD H.—J, Galt, Ont., Can.
WILKINS, ALFRED F.—AM, Boston, Mass.
WILLIAMS, STEPHEN L.—AM, Hartford, Conn.
WILLIAMSON, JOHN L.—AM, Rochester, N. Y.
WILMOT, G. W.—M, Hazleton, Pa.
WILSON, WILLIAM W.—AM, Puget Sound, Wash.
WINDER, FRANK J.—AM, Bronx, New York, N. Y.
WINGARD, TODD A.—M, Washington, D. C.
WISSOTSKY, EUGENE E.—M, Washington, D. C.
WOOD, THOMAS A. S.—AM, Lowell, Mass.
WOODWARD, ALBERT L.—J, Worcester, Mass.
WORDEN, FRANK B.—M, Philadelphia, Pa.
WYLD, ROBERT H.—M, New York, N. Y.

YOUNG, CHARLES H.—A, Bethlehem, Pa.

ZABRISKIE, CLAUDE I.—AM, Paterson, N. J.
ZAVARINE, IGOR N.—J, New Haven, Conn.
ZEDER, FRED M.—M, Elizabeth, N. J.
ZYCHLINSKI, L. W.—J, New York, N. Y.

EMPLOYMENT SERVICE BULLETIN

Conducted by the Employment Service of The Federated American Engineering Societies
29 West 39th Street, New York

Copies of this bulletin are mailed weekly to the Local Sections Chairmen listed below. Persons interested may call at the addresses given and secure latest employment information. Also any members who are aware of positions available are requested to report them to the nearest Local Section Chairman.

NAMES AND ADDRESSES OF LOCAL SECTION CHAIRMEN

FRANK O. ELLENWOOD, 1821 Goodyear Ave., Akron, Ohio
N. C. HARRISON, Atlantic Steel Co., Atlanta, Ga.
H. D. BENNETT, 2114 Allendale St., Baltimore, Md.
F. G. CUTLER, Tennessee Coal, Iron & R. R. Co., Ensley, Ala.
ELMER SMITH, General Electric Co., 84 State St., Boston, Mass.
B. S. HUGHES, S Zaremba Co., 506 Niagara Life Bldg., Buffalo, N. Y.
PROF. A. J. WOOD, Penn. State College, State College, Pa.
PROF. H. S. PHILBRICK, Northwestern Univ., Evanston, Ill.
J. A. POLLAK, The Pollak Steel Co., P. O. Box 1461, Cincinnati, Ohio
J. H. HERRON, 1360 W. 3rd St., Cleveland, Ohio
T. L. WILKINSON, 406 Boston Bldg., Denver, Colorado
PROF. WM. T. MAGRUDER, Ohio State Univ., Columbus, Ohio
EDWIN PUGSLEY, JR., Winchester Repeating Arms Co., New Haven, Conn.
ERNEST GLEDHILL, Union Metallic Cartridge Co., Bridgeport, Conn.
S. F. JETER, Hartford Steam Boiler Insp. & Ins. Co., 56 Prospect St., Hartford, Conn.
C. K. DECHERD, Factory, E., Intntl. Silver Co., Meriden, Conn.
HUGH L. THOMPSON, Cons. Engr., Waterbury, Conn.
RALPH COLLAMORE, Smith, Hinchman & Grylls, 710 Wash. Arcade Bldg., Detroit, Mich.
CAPT. J. L. HUGHES, Watervliet Arsenal, Watervliet, N. Y.
E. H. KENDALL, Erie Forge & Steel Co., Erie, Pa.
FOSTER RUSSELL, Box 27, Spokane, Wash.
F. C. SMITH, 1504 Carter Bldg., Houston, Texas
CHARLES BROSSMAN, 1503 Merchants Bank Bldg., Indianapolis, Ind.
ALBERT T. KELLER, Rm. 435, Bethlehem Steel Co., Bethlehem, Pa.
H. L. DOOLITTLE, So. Cal. Edison Co., Edison Bldg., Los Angeles, Cal.
H. D. CORNELL, 308 New Wright Bldg., Tulsa, Okla.
CHARLES A. CAHILL, Wisconsin Federal Fuel Admn., 1426 First Natl. Bk. Bldg., Milwaukee, Wis.
D. W. FLOWERS, St. Paul Gas Light Co., 6th & Jackson St., St. Paul, Minn.
E. W. CARR, 425 Gravier St., New Orleans, La.
C. B. HAMILTON, JR., Hamilton Gear & Mach. Co., Toronto, Canada
JOHN DICKSON, 808 Pittock Block, Portland, Ore.
H. P. LIVERSIDGE, Phila. Elec. Co., 1000 Chestnut St., Philadelphia, Pa.
S. B. ELY, 5122 Pembroke Pl., Pittsburgh, Pa.
PROF. JAS. A. HALL, Brown Univ., Providence, R. I.
J. F. ANCONA, 304 Cutler Bldg., Rochester, N. Y.
E. W. SCHADEK, Ruemmeli-Dawley Mfg. Co., 3923 Chouteau Ave., St. Louis, Mo.
W. W. HANSCOM, 848 Clayton St., San Francisco, Cal.
EDWIN M. MACKIE, Pneumelectric Mch. Co. 581 S. Clinton St., Syracuse, N. Y.
J. B. NORDHOLT, The Toledo Steel Castings Co., Toledo, Ohio
C. L. ADAMS, 1647—24th St., Moline, Ill.
HUBERT E. COLLINS, 132 Boyce Ave., Utica, N. Y.
WM. F. LEE, Box 192, Richmond, Va.
PROF. GEORGE A. WESCHLER, Catholic Univ. of America, Washington, D. C.
W. L. NEWELL, 1017 Alaska Bldg., Seattle, Wash.
E. HOWARD REED, Reed & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

PRODUCTION MANAGER with experience in production work in textile mills. High-grade man required. Company operating several plants in which Leitch plan of industrial democracy has been installed; wants manager of industrial relations with experience in directing employee-representation plans; calls for mature judgment and definite experience. No mere theorist acceptable. Only men with experience with Leitch plan considered. X-396.

ASSISTANT PROFESSOR IN MECHANICAL ENGINEERING. Broad technical training and some experience in teaching as well as in engineering practice desired. Should be capable of teaching subjects ordinarily required in course in mechanical engineering such as power development with steam engines, turbines, or gas engines, power-plant design, or engineering laboratory practice such as is ordinarily given in mechanical-engineering courses. Location Northwest. Give careful and authentic record of training and experience together with references and photograph. X-450.

INSTRUCTOR IN MECHANICAL ENGINEERING with experience with gas engines preferred; desirable that applicant have some teaching experience altho not absolutely necessary provided record of training and engineering experience is satisfactory. Give careful and authentic record of training and experience together with references and photograph. Location Northwest. X-451.

INSTRUCTOR IN MECHANICAL DRAWING and DESCRIPTIVE GEOMETRY. Duties will be to teach these subjects under direction of professor in charge. Work will consist principally in teaching freshman classes. Give careful and authentic record of training and experience together with references and photograph. Location Northwest. X-452.

PROFESSOR OF MECHANICAL ENGINEERING, graduate of engineering college of University who has had both teaching and industrial experience. Location Nova Scotia, Canada. X-498.

INSTRUCTOR for classes in theoretical mechanics and physics, possibly one in mathematics and in drawing. Location New York State. X-515.

YOUNG ENGINEER with selling ability to train for executive capacity. If services are satisfactory will be given opportunity to be financially interested. Give experience and initial salary desired. Location New York City. X-541.

ASSISTANT RESIDENT ENGINEER to supervise operation and maintenance of boilers, turbines and mechanical equipment of plant, reporting direct to Resident Engineer, in charge of entire installation. Must know how to direct proper burning of heavy Mexican crude oil in boiler plant and how to make performance test on burners, boilers and turbines. Must know the keeping of complete and accurate plant operation data and be able to supervise the maintenance of plant equipment. Must have at least five years' experience as operating engineer or superintendent in charge of steam and of large modern steam-turbine plants, either commercial or industrial. Must be graduate in mechanical or electrical engineering from one of the leading technical schools, such as M. I. T., Yale, Stevens, Pratt, Troy, Polytechnic, etc. Spanish desirable but not essential. Age preferably about 35. Married or single. Both man and wife (if married) must be decent, high-type, clean-living people. Man must be good executive, good organizer, good handler of men and not a disturbing element. Three year contract. Location Chile. X-555.

PROFESSOR of drawing and design desired by university in Middle West to take charge of department in college of engineering. High-grade man of energy and ability desired and preferably one who can handle the general engineering drawing and the drawing courses in architectural engineering. X-558.

SALESMEN to handle sale of line of quality high-speed drills, reamers and cutters on commission basis. Applicants should have experience and acquaintance among users of this product in order to secure business soon after they start operation in order to build up as soon as possible their remuneration out of commissions on sales. We propose to protect each salesman with select territory in which to operate. A man familiar with trade should very soon build up income producing source for himself. Write, outlining fully past experience and to what extent you can secure high-speed tool business so that we can arrange an appointment for an interview to cove.. X-571.

SALESMAN with centrifugal-pumping machinery and sales experience; also, water-supply experience desirable. Location Mid-West. X-578.

OPERATING TECHNICAL STEAM ENGINEER to take entire charge of plant composed of 12 boiler houses ranging from 200 to 6,000 hp each, total capacity, 22,000 hp. and including water-treating plant, steam-distributing lines, etc. Boilers oil fired. Applicant must be thoroughly conversant with steam-generating apparatus and capable of handling and directing men. Will be responsible for economical operation and up-keep of entire steam plant. Population of town approximately 25,000; good schools and city which is building rapidly. Would like man of middle age who has considerable experience operating boiler houses. Write stating experience and salary expected. Location Texas. X-583.

GENERAL INSPECTOR for company manufacturing gold-filled watch cases in Middle West. X-584.

MASTER MECHANIC for company manufacturing gold-filled watch cases. X-585.

SALESMEN to handle on commission basis sale of safety device for use in handling freight. Some mechanical ability will be necessary to assist prospects to solve their freight-handling problems, but this is not essential so long as the salesman is intelligent to adapt himself to conditions as he meets them from time to time in his interviews with prospective users. We propose to protect each salesman with a select territory in which to operate exclusively. Write for appointment for interview. X-588.

STRUCTURAL STEEL ENGINEER for sales work in south. Three men needed for Mississippi, Florida, North Carolina, and South Carolina. Design shop-fabricating experience essential. X-595.

ENGINEER GRADUATE with several years' experience and desire to get into the fan-sales game. Location Missouri. X-597.

YOUNG MEN with some technical training and some practical experience for time-study work in men's clothing industry. Previous time-study experience not essential. Splendid chance for advancement. State full particulars in application. Location New York. X-611.

ENGINEER with experience in operating stationary oil engines, preferably the DeLaVergne type. Prefer single man. Location South America. X-613.

DESIGNER OR MAINTENANCE ENGINEER experienced in slaughter-house equipment and design. Location South America. X-618.

AUTOMOBILE AGENT, would be glad to meet man wishing to go into partnership in automobile business and would join him in representing cars in Englewood and Hackensack. X-619.

ENGINEER, thoroughly conversant in packing, shipping, and traffic. Must have practical experience in devising most economical containers for proper packing of empty tin cans, in fibre, carton, or wood boxes, etc. In majority of cases these containers are returned to us to be used over again, and in this instance we are anxious to devise some type of standard collapsible containers. Location New Jersey. X-620.

GRADUATE MECHANICAL ENGINEER as instructor in charge of shop work; also to take junior mechanical laboratory class in southern university. Salary depends on experience. Some manufacturing experience desirable. X-627.

INSTRUCTOR to serve in steam, gas, and material-testing laboratories. Should be man of some experience in a good mechanical-engineering laboratory. Location Northwest. X-630.

ASSISTANT PROFESSORS of engineering drawing in well-established state and Federal supported polytechnic institute, wanted. Applicant must be thoroughly competent to teach any or all of the subjects dealt with in French's Engineering Drawing. Assurance of promotion to full professorship to properly qualified men. Location Virginia. X-632.

MEN AVAILABLE

The large number of requests to insert notices under this heading makes it necessary hereafter to limit the number of words in each notice to 20 so that as many members as possible may be accommodated.

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter; unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

MECHANICAL ENGINEER desires permanent position with sales department. Excellent European connections, familiar with trade conditions. SM-6402.

INDUSTRIAL EXECUTIVE. Graduate mechanical engineer, experienced production manager, and superintendent of machine shop and foundries. Successful. Record shows results. SM-6403.

ASSISTANT SUPERINTENDENT. Plant engineer, age 31; married. Aluminum and copper sheet and tube. Locomotive, maintenance construction, testing. Would consider sales. SM-6404.

GRADUATE MECHANICAL ENGINEER. American, age 29; married. Served special R. R. apprenticeship; 6 years' cane-sugar centrals P. R. as master mechanic R. R., assist. elec. engineer and mech. and construction engineer. Speaks Spanish fluently. Desires connection concern handling sugar machinery. Location immaterial. SM-6405.

TECHNICAL GRADUATE age 27; single. Eight years' plant design and construction. Minimum salary $200 per month. Location immaterial. SM-6406.

MECHANICAL ENGINEER. Transmission, elevator and conveyor equipment, also belting; 20 years' experience design, sales, and research. Employed. Salary $4800. SM-6407.

EXECUTIVE, experienced; machinery manufacturing and marketing. Can bring out line in which reputation is already established. SM-6408.

PRACTICAL EXECUTIVE, 20 years' experience; machinist, toolmaker, designer, works manager. Always student but success due to personal contact with problem. SM-6409.

PRODUCTION MANAGER OR ENGINEER. Technical graduate; age 36; married, 16 years' manufacturing experience from machine shop to executive end. Modern methods with practical application; SM-6410.

INSTRUCTOR AND DESIGNER. College graduate; 15 years' experience machine shop, machine and tool design, including 2 years teaching mechanical engineering subjects. Desires position either teaching or designing. SM-6411.

SUPERINTENDENT textile mill, age 28; married; graduate mechanical engineer, studied Lowell Textile School, knitting-mill superintendent 6 years. Cost specialist. SM-6412.

MECHANICAL ENGINEER production man, designer; 15 years' experience general engineering, economical; man of creative ability; can stimulate output; desires executive position. SM-6413.

MECHANICAL-STRUCTURAL ENGINEER. Age 31; 10 years' experience; chief engineer, chief draftsman. Experience covers steel mil's, tube mills, furnaces, machinery, buildings, power plant and bridges. Capable executive. Salary $4000. SM-6414.

GRADUATE MECHANICAL ENGINEER, machinist 7 years. Familiar modern shop methods and systems; assistant superintendent or in executive capacity. Recently employed as mechanical engineer. Age 28; will go anywhere. SM-6415.

FACTORY SUPERINTENDENT, metal stampings, American; age 37; 16 years' practical manufacturing experience. Thorough knowledge modern production methods. Close observer of costs. Available one month's notice. SM-6416.

POWER-PIPING ENGINEER, 6 years' experience designing and installing piping equipment desires position. Married; age 30; any location. SM-6417.

WORKS MANAGER interests men in their work, increases efficiency; 20 years' successful experience. Best of references, American; graduate mechanical engineer. SM-6418.

ENGINEER. M. E. graduate with several years' experimental mill and laboratory experience. Now University instructor. Desires summer employment. Available 4 months. Age 28. SM-6419.

MECHANICAL ENGINEER, age 27; married; technical education; 6 years' experience power-house equipment and machine tools; gas, steam and oil engines, as draftsman, production manager, mechanical and chief engineer. SM-6420.

MECHANICAL ENGINEER, age 36. Expert draftsman. Experienced design, construction and operation power plants, water works, reinforced-concrete and structural steel, shops, etc. Design, management. Capable executive; 16 years' experience; 10 years' oil-refinery experience. SM-6421.

ENGINEER desires position designing, development; age 33; married; technical education; 14½ years' broad experience machinist and toolmaker, machinery, design, production, plant layout. Capable invention. SM-6422.

MANAGER of ability and experience will buy controlling interest in small company with really good article to manufacture. SM-6423.

MECHANICAL ENGINEER. Experienced in tool design and tool-room work. Age 33. SM-6424.

GENERAL OR FACTORY MANAGER with 20 years' successful experience manufacturing and management. Available July 15. Excellent references. Salary $12,000. SM-6425.

PATENT ATTORNEY, technical graduate; age 38; attorney at law Cal.; desires position in East, or to take over patent practice. SM-6426.

ENGINEER, mechanical assistant, age 30; technical graduate; 10 years' experience, layout, checking machinery. Position desired assistant engineer New York City. SM-6427.

PRODUCTION MANAGER, superintendent or assistant. Technical graduate; 8 years' experience time study, organization, planning stores, production and cost. Forge, foundry, interchangeable machine parts. SM-6428.

EXECUTIVE ENGINEER. Age 37; experienced design, construction and maintenance industrial plants and handling men, desires position with manufacturing concern. SM-6429.

MECHANICAL ENGINEER. American; age 33; graduate; 11 years' experience specifications, design, supervision installation mechanical equipment public, industrial buildings; desires position executive with industrial organization or staff architects and engineers. Best references. SM-6430.

MECHANICAL AND POWER ENGINEER. Technical graduate; 7 years' experience along broad lines; chemical, machine shop, sugar engineering, industrial and power-plant operation; design, layout, heating, etc. SM-6431.

DESIGNING ENGINEER, technical graduate; 19 years' diversified manufacturing experience; tools, automatic machinery, etc.; superintendent stamped and interchangeable products; executive, N. Y. C. preferred. SM-6432.

MECHANICAL ENGINEER, graduate; 5 years' shop and design experience oil engines; 2 years' assistant chief engineer and charge of drafting on Diesel-engine development. Business and executive ability. Best references. SM-6433.

MECHANICAL ENGINEER, Stevens graduate; age 29; desires position as assistant to executive; 4 years' general engineering experience, at present employed. Character above reproach. SM-6434.

MECHANICAL ENGINEER, graduate; 11 years as designer, chief draftsman, assistant engineer and teacher, desires permanent position along similar lines. SM-6435.

MECHANICAL ENGINEER. M.E. degree 1908; age 36; single; master mechanic; material inspector, chief engineer, electrician, general contractor; 4 years I. C. C. R.R. valuation; 3 years' charge field work. Min. salary $300. SM-6436.

DEVELOPMENT ENGINEER, chemical or food industry. Recovery of industrial wastes. Economy of production and operation. Salary $3600. SM-6437.

MEMBER, eight years' teaching experience, in addition to 20 years' engineering work is available for professorship in mechanical engineering. SM-6438.

MECHANICAL INDUSTRIAL ENGINEER, age 34; practical experience 13 years. Design, construction, operation, valuation of industrial equipment and plants. Selling experience. Executive. References furnished. SM-6439.

ENGINEER, 16 years' experience as designer on passenger, freight elevators, conveying coal-handling machinery; also designing machinery for low-temperature coal carbonization. SM-6440.

MECHANICAL ENGINEER. Graduate with 20 years' experience mechanical end of electrical business, desires position executive, assistant executive or in consulting capacity. Location immaterial. SM-6441.

FACTORY EXECUTIVE, mechanical and steam engineer; 18 years' experience; cast brass and iron product. Expert on engineering specialties. Salary $6500. SM-6442.

MECHANICAL ENGINEER (Columbia), 6 years' construction and operating experience including all phases of central-station work. SM-6443.

MANUFACTURING ENGINEER, shop and office experience; 16 years' on interchangeable steel and brass product. Education, mechanical and commercial; good executive. SM-6444.

MECHANICAL SALES ENGINEER. Acquainted in manufacturing centers New Jersey adjacent to New York City, wishes to connect with company desiring to cover this field. SM-6445.

TECHNICAL ENGINEER. 5 years executive; 3 years practical chief draftsman, production engineer, safety engineer. Age 28; Assoc. Mem. A. S. S. E. SM-6446.

PRODUCTION MANAGER, technical graduate; age 36; married; 15 years' manufacturing experience from machine shop to executive end. Modern methods with practical application. SM-6447.

ENGINEER, PRODUCTION-EFFICIENCY SALES. 17 years' manufacturing all branches. Could manage or assist in management of progressive business. Age 37. SM-6448.

SALES ENGINEER, age 27; mechanical engineer; 7 years' selling and designing experience, heating, ventilation, power plant and refrigeration, etc. Desires to connect with progressive firm of engineering equipment. SM-6449.

GRADUATE INDUSTRIAL ENGINEER, age 34; shop foreman and superintendent. Time study and quantity production under direction of H. L. Gantt. SM-6450.

MECHANICAL ENGINEER, inventive; 18 years' experience general mechanical, designing especially automatics. Married; age 43. Location vicinity of New York. SM-6451.

ASSISTANT PROFESSOR mechanical engineering; specialty steam engineering and machine design including kinematics. Engineering extension work preferred. SM-6452.

MECHANICAL ENGINEER, college graduate, Swiss. One year in America; 5 years' experience general mechanical engineering. Desires bigger field of action. SM-6453.

DESIGNER on tools, special machinery and other equipment for quantity production. Broad experience and successful on intricate work. Location Indiana. SM-6454.

TECHNICAL GRADUATE age 29; married. Worked from apprentice to assistant factory superintendent. Desires permanent connection. Salary secondary to future opportunity. Location Middle West. SM-6455.

MECHANICAL ENGINEER, 5 years' field and office experience in industrial maintenance and construction. Age 27; single; employed. Location immaterial. SM-6456.

FACTORY EXECUTIVE. Age 27; 4 years' woodworking experience, desires position along production lines with large progressive woodworking concern. SM-6457.

SALES ENGINEER. Experienced in sale, testing and efficient application of lubricating oils. Would be interested in mechanical equipment sales work. SM-6458.

DESIGNER, 10 years' experience, special machinery, tools, experimental work. Last 3 years in charge of development of intricate machine. References. SM-6459.

CHEMICAL ENGINEER with 8 years' broad experience; thoroughly trained for managerial position; will be available September 1. SM-6460.

MECHANICAL ENGINEER, graduate; 14 years' steel plant, machine shops, industrial engineering. At present engaged industrial-plant layout and production work. Desires position industrial engineering company or plant. Philadelphia or vicinity. SM-6461.

PLANT ENGINEER, age 39; technical; accustomed to full responsibility for mechanical and electrical equipment, design and construction at large modern plants. SM-6462.

SALES ENGINEER, mechanical-electrical, American; age 38; married. Speaks Spanish, Portugese, and German fluently. Desires to connect manufacturer or export house on Pacific Coast; 10 years' experience Orient and South America. SM-6463.

MECHANICAL ENGINEER, Stevens, age 26; married; 5 years' industrial experience including drafting, estimating, maintenance and supervision. Locality vicinity of New York. SM-6464.

MECHANICAL ENGINEER; graduate M. I. T.; age 26. Specialized steam and combustion engineering; now chief engineer of 800-kw., plant, desires position as asst. chief engineer or combustion engineer in 5000- to 15,000-kw. plant. SM-6465.

MECHANICAL ENGINEER, graduate; age 32. Ten years' successful experience locomotive construction as foreman, inspector, draftsman, designer. Desires live position in any line offering opportunity for advancement. SM-6466.

ASSISTANT GENERAL SALES MANAGER. Age 39; 15 years' experience Northwest and Canada, air compressors, rock drills, hoisting engines, etc. SM-6467.

WORKS MANAGER. Age 40; married; 19 years' experience varied industries, bench hand superintendent. Permanent position only. Fitted to organize new industry or build up present business. SM-6468.

MECHANICAL ENGINEER; age 34; 10 years' experience design, construction and operation of industrial and power plants. Excellent business training and capable of handling men. SM-6561.

MANUFACTURING EXECUTIVE desires to locate in Southwest. Technical, practical and executive training in manufacture of gasoline engines and allied lines. SM-6562.

SALES ENGINEER. Graduate textile engineer; age 29; married. Now employed; 4 years' experience engineering; 2 years Captain Coast Artillery. Wants position selling high-grade product in New England. SM-6563.

MECHANICAL ENGINEER, 5 years' experience in tropical sugar factory having entire charge of factory operations and maintenance. Broad general experience. SM-6564.

CHEMIST and CHEMICAL ENGINEER experienced as college professor and also research and manufacturing chemist. At present manager of government plant. SM-6565.

INDUSTRIAL ENGINEER; junior; age 26; graduate. Experience; time study, plant layout, production costs, estimating, cost and production control installation. Salary $200. Metropolitan district preferred. SM-6566.

MECHANICAL ENGINEER, technical graduate; 8 years in manufacturing, supervision of steam-power plants, planning of new factories. Desires engineering connection in New York City. SM-6567.

MECHANICAL ENGINEER, technical graduate; age 25; single. Two years' student test training with General Electric Co. Position desired with Company manufacturing power-plant equipment. SM-6568.

MECHANICAL ENGINEER. M.E. degree; experienced in teaching and factory management. Age 31; married. Available at once for teaching, experimental work or industrial management. SM-6569.

SUGAR AND CHEMICAL ENGINEER technical graduate; 12 years' experience in all branches of sugar manufacturing; desires position as sugar engineer or instructor. SM-6570.

MECHANICAL ENGINEER, 11 years' experience in paper mills; steel sash, auto spring and factory-truck manufacturing. Supervision of power, maintenance construction and manufacturing. Some sales experience. Now available for any work where such experience would be of value to employer. Age 34; married; Cornell graduate. SM-6571.

ASSISTANT TO WORKS OR FACTORY MANAGER, Penn State 1914–16; 7 years' manufacturing experience, drafting, tools, finding costs and doing organization work. Married; salary $175 month; available on 15 days' notice. SM-6572.

MECHANICAL ELECTRICAL ENGINEER; age 34; technical graduate. Thirteen years' experience in construction, design, operation of power plants and power systems, boilers, steam turbines, steam and electrical distribution systems, etc. Willing to locate in West Indies or South America. Knowledge of Spanish. SM-6573.

TEACHERS AVAILABLE

ELECTRICAL ENGINEER. Univ. of Kansas; age 31; married; 3 years' teaching experience; steam electric-power plants. $5000, not less. SM-6469.

MECHANICAL and ELECTRICAL ENGINEER. Cornell University; age 57; married. Strength of material; mechanical drawing. Refrigerating and experimental engineer. SM-6470.

M. I. T. M. E. Age 26; single; mechanical and machine drawing. Engineering and hydraulic laboratory. SM-6471.

MECHANICAL ENGINEER. Lehigh; age 34. No teaching experience. SM-6472.

MECHANICAL ENGINEER. Tulane Univ. Age 39; single. Experimental, steam, mechanics and sugar-factory engineering. SM-6473.

MECHANICS INSTITUTE, age 30; married. Drawing and mathematics. SM-6474.

MECHANICAL ENGINEER, Cornell Univ. age 33; married; industrial-engineering mechanics, thermodynamics, hydraulics; physics and machine design. SM-6475.

ELECTRICAL ENGINEER. Iowa State College. Age 37; married. Mathematics; mechanical draw-

ing; machine design; thermodynamics and physics. SM-6476.

MECHANICAL ENGINEER, M. I. T.; age 41; married. Industrial engineering; plant management; machine-design and testing laboratories. SM-6477.

MECHANICAL ENGINEER, age 38; married. Power plant, mechanical drawing and descriptive geometry. Location, West Coast U. S. SM-6478.

MECHANICAL ENGINEER. Penn. State. Age 38; married. Mechanical engineering subjects. Location, East U. S. SM-6479.

MECHANICAL ENGINEER. McGill Univ. Age 44; married. Machine design: strength of materials, thermodynamics; experimental engineering. U. S. or Canada. Salary $3000–4000. SM-6480.

MECHANICAL ENGINEER. Rensselaer Poly. Inst.; age 30; married; mechanical-engineering subjects and mathematics. Location East. SM-6481.

MECHANICAL ENGINEER. Brown Univ.; age 37; single. Mechanical drawing; applied mechanics; specialized in machine design. Location East. SM-6482.

MECHANICAL ENGINEER. Univ. of Washington; age 38; married. Mechanical-engineering subjects and naval architecture. Location Europe. SM-6483.

MECHANICAL ENGINEER. Cornell Univ.; age 26; married. At present, professor of mechanical engineering in eastern university. Location East. SM-6484.

MECHANICAL ENGINEER. Univ. of Minnesota. Age 36; married. At present prof. mechanical engineering Eastern University. Mid or Far West. SM-6485.

MECHANICAL ENGINEER. M. I. T., age 40; married. M. E. subjects. East. SM-6486.

MECHANICAL ENGINEER. West Virginia Univ. Age 39; married; at present M. E. prof. Eastern University. West or South. SM-6487.

MECHANICAL ENGINEER. Kentucky State Univ.; age 39; married. Prof. M. E. Mid-West University; salary $5000-6000. East or Mid-West. SM-6488.

MECHANICAL ENGINEER. University of Wisconsin; age 36; single. Professor of M. E. Mid-West University. SM-6489.

MECHANICAL ENGINEER. Cornell; age 38; married. Prof. M. E., Western Univ. U. S. SM-6490.

MECHANICAL ENGINEER, Geo. Washington Univ. age 50; married; machine design and mathematics. Salary $4000–5000. East. SM-6491.

MECHANICAL ENGINEER. Kentucky State. Age 34; married. M. E. subjects. $4500. SM-6492.

MECHANICAL ENGINEER; age 38; married. Mechanical drawing; applied mechanics and calculations applied to engineering. So. Cal. SM-6493.

MECHANICAL ENGINEER. Tufts; age 35; married. Teaching mechanical engineering subjects since 1911. Mid-West. SM-6494.

MECHANICAL ENGINEER. Lafayette; age 31; single. M. E. subjects. East. SM-6495.

MECHANICAL ENGINEER. Lowell Commercial College; age 54; married. M. E. and architecture. South or foreign. Salary $3600–4000. SM-6496.

MECHANICAL ENGINEER. Cornell; age 34; married; steam and gas power, also all mechanical engineering subjects. East. Salary $3500–5000. SM-6497.

MECHANICAL ENGINEER. Ohio State University; age 31; married. Machine drawing, mechanical-engineering subjects. SM-6498.

MECHANICAL ENGINEER, Cornell; age 30; married. Steam and gas-engineering; machine design. SM-6499.

MECHANICAL ENGINEER. Columbia; age 39; married. Mechanism, mechanical drawing and machine design. New York State; salary $3000–4000. SM-6500.

MECHANICAL ENGINEER. Worcester Poly.; age 32; married. Shop management; machine design and thermodynamics, New England. Salary $5000. SM-6501.

MECHANICAL ENGINEER, Univ. of Wisconsin and Rose Poly. age 32; married. Gas engineer, editorial work, mechanical-engineering subjects. Salary $4800–5000. West. SM-6502.

MECHANICAL ENGINEER, Armour Inst. of Tech. age 46; married. Experimental engineering; machine design; kinematics; woodwork and forgings. East or Mid-West. SM-6503.

MECHANICAL ENGINEER. Pratt Institute; age 43; married. Steam engineering; mechanical drawing and machine design. SM-6504.

MECHANICAL ENGINEER Case School Applied Science; age 42; married; steam engineering; hydraulics; mechanism; thermodynamics and mechanical laboratory. SM-6505.

MECHANICAL ENGINEER. Yale Univ. age 45; married. Engineering drawing, descriptive geometry and machine design. East. SM-6506.

MECHANICAL ENGINEER. Yale University; age 49; single. Mechanical-engineering subjects and mathematics. SM-6507.

MECHANICAL ENGINEER. University of Michigan; age 49; married; gas and steam engineering; descriptive geometry; kinematics and machine design. Central or Eastern States. SM-6508.

MECHANICAL ENGINEER. Iowa State; age 37; married; mechanical engineering subjects; $6000. West. SM-6509.

MECHANICAL ENGINEER, University of Maine; age 36; married. Steam engineering; hydraulics; power-plant design and mechanics. Pa. Salary $3600–4000. SM-6510.

MECHANICAL ENGINEER. Stevens; age 59, married. Professor M. E. Southern University. South or East. SM-6511.

MECHANICAL ENGINEER, C. C. N. Y. age 27; single. Taught physics. Location N. Y. C. SM-6512.

MECHANICAL ENGINEER, Pratt Inst; age 34; single; taught military tactics and military engineering. SM-6513.

MECHANICAL ENGINEER; Cornell and Vanderbilt Univ; age 50; married. Desires position professor or instructor, C. E.; M. E. or E. E. SM-6514

MECHANICAL ENGINEER; N. Y. Univ. applied science; age 57; married. Experience: instructor 3 years; asst. prof. drawing 4 years; assoc. prof drawing 6 years; Assoc. prof. mechanics and machine design. Location Middle Atlantic or Northeastern States. SM-6515.

MECHANICAL ENGINEER; Cornell; married; taught M. E. Lab; gas-engine design. Location New York, Pa., Ohio, Michigan. SM-6516.

MECHANICAL ENGINEER; Stevens Inst; age 41; single. Instructor or assistant prof. Location New York or vicinity. SM-6517.

MECHANICAL ENGINEER. Univ. of Pa. age 24; single. Location N.Y. or vicinity. SM-6518.

MECHANICAL ENGINEER; Cornell Univ; age 32; married. No teaching experience SM-6519.

MECHANICAL ENGINEER; Univ. of Kentucky; age 25; married. Desires to teach steam engineering. SM-6520.

MECHANICAL ENGINEER; Harvard Univ; age 24; taught combustion engineering. Location U. S. SM-6521.

MECHANICAL ENGINEER; M. I. T.; age 25; single: experience; assisted in applied mechanics and machine design. SM-6522.

MECHANICAL ENGINEER. Columbia Univ; age 27; married. Location vicinity N. Y. or Phila. SM-6523.

MECHANICAL ENGINEER, M. I. T. and Middlebury College, Vt; age 31; single; no teaching experience. SM-6524.

MECHANICAL ENGINEER; Stevens Inst. of Tech.; age 23; single; taught mechanical engineering laboratory; including pumps, turbines, boilers, etc. Location Brooklyn or New York City. SM-6525.

MECHANICAL ENGINEER; Purdue Univ. age 28; married. Taught mathematics, physics, gas engineering, shop work. Location South or Middle West. SM-6526.

MECHANICAL ENGINEER; Lehigh; age 24; single; no teaching experience. Location Baltimore, Philadelphia, New York. SM-6527.

MECHANICAL ENGINEER; Virginia Poly Inst.; age 40; married. Thermodynamics; gas and oil engines; descriptive geometry; steam power-plant engineering. SM-6528.

MECHANICAL ENGINEER. Mississippi Agri. & Mech. College; age 34; single; no teaching experience; prefer location Middle West or South. SM-6529.

MECHANICAL ENGINEER. Iowa State; age 24; single; subjects taught academic math; geometry. Location Middle West. SM-6530.

MECHANICAL ENGINEER. Kansas State College; age 25; married; taught machine design; mechanism; kinematics; machine drawing. SM-6531.

MECHANICAL ENGINEER. Univ. of Nebr. B. Sc.; Univ. of Colorado M. E.; Univ. of Santa Clara Ph.D. age 39; married. Experience 3 years instructor; one year assist. prof.; 7 years prof.; 2 years Dean. Salary $5000. Location U. S. SM-6532.

MECHANICAL ENGINEER; age 26; married; taught mechanical drawing and shop practice. Location Wilmington, Del. or between Philadelphia and Baltimore. SM-6533.

PHYSICIST and ENGINEER, age 31; married. E. E. and Ph.D. degrees, Columbia. Mathematical physics, electrical theory, dynamics, mechanical and automobile engineering, research, etc. Salary $5000. SM-6534.

MECHANICAL ENGINEER; Brown Univ; age 26; single. Taught elementary subjects evening school. Prefer Boston vicinity. SM-6535.

MECHANICAL ENGINEER, M. I. T.; age 37 married; taught mechanical drafting. Location New England. SM-6536.

MECHANICAL ENGINEER; Colorado School of Mines; age 38; married; no teaching experience. Location United States. SM-6537.

MECHANICAL ENGINEER. M. I. T.; age 36; married; no teaching experience; location Eastern U. S. SM-6538.

MECHANICAL ENGINEER; age 26; married; taught machine shop. Location East or South. SM-6539.

MECHANICAL ENGINEER. Univ. of Maryland and Cornell; age 32; married; experience director department mechanical engineer. Location East, South or Central. SM-6540.

MECHANICAL ENGINEER. Michigan Agricultural; age 29; married; taught machine and tool design; kinematics. Location Middle West or South. SM-6541.

MECHANICAL ENGINEER. Univ. of Michigan, age 28; married; taught steam engineering; power-house design; thermodynamics; heat engineering, charge steam laboratory. Location Middle West. SM-6542.

MECHANICAL ENGINEER. Tufts; age 38; married. Location East. SM-6543.

MECHANICAL ENGINEER; Mich. Agr. age 25; married. Experience; assistant metallurgical laboratory. Location preferred Middle West SM-6544.

MECHANICAL ENGINEER; Cornell; age 28; married; taught mechanical drawing and machine design. Location Central or Far West. SM-6545.

MECHANICAL ENGINEER. Pennsylvania; age 31; single; taught mechanics; machine design; tool design, mechanical drawing. Location East of Chicago. SM-6546.

MECHANICAL ENGINEER; Kansas State Agr.; age 31; married; taught thermodynamics applied mech. shop course; mechanical drawing. SM-6547.

MECHANICAL ENGINEER; Yale; age 24; single; taught applied mechanics; kinematics; strength of materials; drawing. Location South or East. SM-6548.

MECHANICAL ENGINEER; Univ. of Iowa; age 32 married. Experience, instructor in industry. Location Philadelphia or vicinity. SM-6549.

MECHANICAL ENGINEER. Purdue; age 28; single; taught adv. drawing; vocational education. SM-6550.

MECHANICAL ENGINEER; Lehigh Univ; age 25; single; taught machine design and mech. drawing. Location U. S. SM-6551.

MECHANICAL ENGINEER; Cornell; age 31; married; taught theoretical and applied mechanics. Location Eastern States. SM-6552.

MECHANICAL ENGINEER; Cooper Union; Poly. Inst. Brooklyn; age 30; married. Vicinity N. Y. City. SM-6553.

MECHANICAL ENGINEER; N. Y. Univ; age 25; single. Location N. Y. City or Bklyn. SM-6554.

MECHANICAL ENGINEER; Williamson School of Mech. trades; age 26; single; taught machine shop practice. Location East or Middle West. SM-6555.

MECHANICAL ENGINEER; Univ. of Kansas; age 32; single; taught mechanical laboratory; steam and gas engineering. SM-6556.

MECHANICAL ENGINEER. Michigan State; age 26; married; taught mechanical drawing and woodwork; electrical works; metallurgy. Salary $4000, location Middle West. SM-6557.

MECHANICAL ENGINEER. Pennsylvania State; age 31; married. Location Pa., New York or Ohio. SM-6558.

MECHANICAL ENGINEER. Univ of Wisconsin; taught machine shop practice. Age 26. SM-6559.

MECHANICAL ENGINEER. Univ. of Michigan; age 21; married; taught steam engineering, power-house design; thermodynamics; heat engines. Location Middle West. SM-6560.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JULY 29, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically.

Unless objection is made to any of the candidates by July 29, 1921, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

DUNGAN, DONALD K., Experimental Engineer, Hulse Kodak Finishing Service, San Jose
FIELD, OLIVER C., Service Engineer, C. F. Braun & Co., San Francisco
MADSEN, CARL F., San Rafael
OGIER, WALTER W., JR., Instructor, Department of Mechanical Engineering, California Institute of Technology, Pasadena
SPRAY, ORLA D., Sales Engineer, Warren & Bailey Co., Los Angeles

Colorado

CLYDE, JOSEPH D., Round House Foreman, Chicago, Rock Island & Pacific Railway Co., Limon

Connecticut

ARMSTRONG, GEORGE W., Superintendent, The Lester & Wasley Co., Inc., Norwich
CARNEY, DANIEL P., Assistant Master Mechanic, Bradley & Hubbard Manufacturing Co., Meriden
FAVORITE, RICHARD J., Leading Draftsman and Engineer, Electric Boat Co., Groton
HUTCHINSON, PALMER H., Sales Engineer, The J. N. Lapointe Co., New London
ROBINSON, ERNEST, Production Engineer, Royal Typewriter Co., Hartford
WALKER, CHARLES W., Works Manager, Walker Typewriter Co., Bridgeport

Delaware

BELKNAP, ETHELBERT, JR., Repairs Engineer, E. I. du Pont de Nemours & Co., Wilmington
CUBBERLEY, A. H., Industrial Engineer, Du Pont Co., Wilmington

District of Columbia

ALLARDT, ERNST W., Mechanical Draftsman, United States Naval Gun Factory, Washington
ANDERSON, PETER M., Chief of Construction Division, Inland & Coastwise Waterways Service, War Department, Washington
BOLTWOOD, HARVEY, Mechanical Engineer, Department of Equipment, United States Railroad Administration, Washington
ERNST, FRANK A., Nitrate Division, Ordnance Department, United States Army, Washington
TORRENS, ROBERT J., Electric Engineer, United States Naval Observatory, Washington

Florida

BROMBACHER, MAX H. C., Chief Engineer, Florida East Coast Hotel Co., Palm Beach
HAMMATT, CLARENCE S., President, Consolidated Engineering Co., Jacksonville

Illinois

BERRY, EDWARD L., Rate Setter, Link-Belt Co., Chicago
BERRYMAN, H. O., Superintendent, American Can Co., Waukegan
BUNN, GILES F., Railway Department, General Electric Co., Chicago
CRAIG, LOUIS B., Assistant Chief Draftsman, Rock Island Arsenal, Rock Island
DAVIDSON, ERICK S., Mechanical Draftsman, Rock Island Arsenal, Rock Island
DICKERSON, F. G., Chicago
DURDIN, AUGUSTUS C., JR., Vice-President and Works Manager, Chicago Pump Co., Chicago
FRAZIER, W. W., Assistant Engineer, The Steel & Tube Co. of America, Chicago
GLOVER, WILBUR G., Secretary and Junior Partner, John R. Kehm Co., Chicago
HAGUE, HAROLD O., Chief Engineer and Superintendent, The Packers Machinery & Equipment Co., Chicago
HALL, THOMAS W., Assistant Editor, Power Plant Engineering, Chicago
HARTLEY, JAMES J., Factory Manager, The Borg & Beck Co., Clearing
HENDERSON, JAMES P., District Inspector, Babcock & Wilcox Co., Chicago
HUNT, WILLIAM G., Engineer, Tupman Thurlow Co., Inc., Chicago
HUSBAND, ROBERT M., Production Engineer, Singer Manufacturing Co., Cairo
JENSEN, KENNETH, Sales Engineer, American Manganese Co., Chicago Heights
KROESCHELL, ROY S., Kroeschell Brothers Co., Chicago
LEWIS, BARTON I., Mechanical Engineer, Laundry Owners National Assn., La Salle
MICHAEL, LOREN P., Mechanical Engineer, Chicago & North Western Railways, Chicago
O'NEILL, HAYLETT, Engineer, Westinghouse Electric & Manufacturing Co., Chicago
ROSE, WALTER E., Manufacturing Analyst, Western Electric Co., Hawthorn
SPITZIG, WILLIAM L., Salesman, Smith-Totman Co., Chicago
STILES, HARRY G., Chief Engineer, General Combustion Co., Chicago
TRIGG, FREDERICK F., Mechanical Draftsman, Rock Island Arsenal, Rock Island
WALTER, ARTHUR L., Designing Engineer, Whiting Corpn., Harvey

Indiana

DRATZ, HERMAN O., Maintenance Engineer, American Steel Foundries, Indiana Harbor
MCCORMICK, RICHARD H., Senior, University of Notre Dame, Notre Dame
MOREHEAD, LLOYD B., Mechanical Engineer, Chicago, Indianapolis & Louisville Railway, Lafayette
NILSON, ENOCH S., Estimator, Haskell & Barker Car Co., Michigan City
THOMSON, JAMES, Chief Engineer, Hubbard Steel Foundry Co., East Chicago

Kansas

STEVENS, OTTO N., The Solvay Process Co., Hutchinson

Kentucky

WARD, OSCAR, General Mechanic, Paintsville

Louisiana

LASSALLE, LEO J., Professor, Mechanical Engineering, Louisiana State University, Baton Rouge
ROTHROCK, RALPH K., Engineer, Rogers-Higgins Co., Inc., New Orleans

Maryland

GIER, FRANK C., JR., Maintenance Foreman of Equipment, Consolidated Gas Electric Light & Power Co., Baltimore
ROWE, JOSEPH E., Chief Ballistician, Aberdeen Proving Ground

Massachusetts

BARBA, CHARLES E., Superintendent, Sea Coast Department, Watertown Arsenal, Watertown
FLEMMINGS, JOHN A., Manager, Stoker Department, B. F. Sturtevant Co., Hyde Park
HANSEN, EDWARD H., Supervising Engineer, The Thompson & Lichtner Co., Boston
HEISE, FREDERICK W., Mechanical Engineer, Springfield Light Co., Springfield
HUSSEY, CHARLES W., Chief Engineer, C. C. Roberts Engineering Co., Boston
NONNENBRUCH, OTTO, Worthington Pump & Machinery Corpn., Cambridge
ROSE, REED A., Student Engineer, General Electric Co., Lynn
WALWORTH, ARTHUR C., President, Walworth English Flett Co., Boston

Michigan

BLACKBURN, GODFREY C., Superintendent, Under-Feed Stoker Co., Detroit
DONNELLY, THOMAS S., Patent Lawyer, Diamond Power Specialty Co., Detroit
HENRY, GUY P., Chief Engineer, Studebaker Corpn., Detroit
MACHOLL, EDWARD A., Experimental Engineer, Standard Computing Scale Co., Detroit
MERCIER, ELMER E., Supervising Erecting Engineer, Diamond Power Specialty Co., Detroit
PRONER, DANIEL A., Mechanical Engineer, Ford Motor Co, Detroit
SHEEHAN, W. G., Vice-President & General Manager, Crystal Washing Machine Co., Detroit

Minnesota

GAUVREAU, VICTOR, Chief Engineer, Pan Motor Co., St. Cloud

Missouri

FOSTER, LOUIS A., Efficiency Engineer, Southern Coal, Coke & Mining Co., St. Louis
HOPPER, WYLLYS G., Chief Engineer, Urbauer Atwood Co., St. Louis
RIDLEY, ROBERT D., Chief Inspector of Boiler, Elevator & Smoke Abatement, St. Louis

Nebraska

RENDELL, HAROLD G., Designing Engineer, United States Army Balloon School Fort Omaha

New Jersey

AKINS, ARTHUR W., Chief Refrigerating Engineer, Bayonne Refinery, Standard Oil Co., Bayonne
ARMSTRONG, ELMER O., Chief Engineer, Hyatt Bearings Division, General Motors Corpn., Harrison
BETTERTON, HERBERT R., Assistant Chief Draftsman, Warren Webster & Co., Camden
BRINKER, ELWOOD S., Shur-Lock Elevator Safety Co., Newark
CARTZDAFNER, R. E., Chief Engineer, Magor Car Corpn., Passaic
DYER, ORRIN L., Chief Tool Designer, Warren Webster & Co., Camden
FETHERSTON, Maurice F., Assistant Engineer, Great Atlantic & Pacific Tea Co., Jersey City
GEISSE, JOHN H., Experimental Engineer, Wright Aeronautical Corpn., Paterson
HEINDLHOFER, KALMAN, Mechanical Engineer, S. K. F. Research Laboratory, Camden
HENDRIE, CHARLES F., Mechanical Engineer, Construction Department, Worthington Pump & Machinery Corpn., Harrison
HESS, FRANK J., Assistant Automotive Engineer, Tidewater Oil Co., Bayonne
HUNTING, GEORGE M., The Grasselli Chemical Co., Grasselli
MACMORRIS, JOHN W., Special Engineering Work, DeLaval Steam Turbine Co., Trenton
MOFFAT, FRASER M., JR., Moffat, Cover & Co., Irvington
OHLAND, FREDERICK W., JR., Standard Oil Co., Eagle Works, Jersey City
PETERSON, IRA E., Teacher, Industrial Department, W. L. Dickinson High School, Jersey City
PIGGINS, EDWIN, Mechanical Draftsman, Monroe Calculating Machine Co., Orange
RANDOLPH, CLIFFORD F., Assistant Chief Engineer, Niles-Bement-Pond Co., Plainfield
SIBLER, CHARLES J., Draftsman, A. S. Cameron Steam Pump Works, Phillipsburg
STENZEL, ROLAND, Salesman, Federated Engineers Development Corpn., Jersey City
TILLEY, ROBERT N., Jersey City
VREELAND, JOHN W., Draftsman, Standard Oil Co., Eagle Works, Jersey City

New York

ADAM, ANDREW B., Mechanical Draughtsman, Cunard Steamship Co., New York
BARROWS, DONALD S., Vice-President in charge of Engineering & Plant Operations, The T. H. Symington Co., Rochester
BEWLEY, WILLIAM E., Sales Engineer, A. M. Watkins, New York
BIANCARDI, JOSEPH F., Leading Draftsman, Equipment Engineering Department, New York Central Railroad Co., New York
BOYER, EDWIN D., Engineer of Maintenance, The New York Air Brake Co., Watertown
BUCHANAN, DAVID McL., Chief Draftsman, Tiphany Phonetic Corpn., New York
BUSWELL, HENRY L., Engineer, Johnson & Higgins, New York
CALL, LEROY J., Construction Engineer, The Carborundum Co., Niagara Falls
CORBETT, HERBERT A., Assistant Works Engineer, Columbian Rope Co., Auburn
DOWNE, HAMILTON B., Industrial Engineer, American Radiator Co., New York
EATON, EMERY W., Estimator, Newburgh Shipyards, Inc., Newburgh
EYCHENE, PAUL, Engineer, United States & Cuban Allied Works Engineering Corpn., New York
FOLEY, ROBERT R., Foamite Firefoam Co., New York
GENBENBACH, W. A., Draftsman, Maintenance Department, T. H. Symington Co., Rochester
GENZLINGER, FRED M., Engineer, P. Pryibil Machine Co., Inc., New York
GREEN, BEN H., Chief Engineer, Olean Electric Light & Power Co., Olean
GRIMM, ADOLPH, Designing Engineer, United States Electro Galvanizing Co., Brooklyn

HARPER, Fred C., Student, Pratt Institute, Brooklyn
HARRIS, William N., Engineer, The Linde Air Products Co., New York
HENNINGER, William A. P., Fuel Oil Engineer, Petroleum Heat & Power Co., New York
HUANG, Shu-Pei, Postgraduate Student, Rensselaer Polytechnic Institute, Troy
IRVINE, Jan S., Special Representative, Niles-Bement-Pond Co., New York
JENKINS, Peter, Engineer in charge of New Constr., Federal Sugar Refining Co., New York
JONES, Arthur E., Sales Engineer, The Terry Steam Turbine Co., New York
KENYON, Lewis C., New York Branch Manager, Heald Machine Co., New York
KIMBER, H. A., Vice-President, Quigley Furnace Specialties Co., New York
KIRBY, James E., Superintendent, Motor Fire Apparatus, O. J. Childs Co., Inc., Utica
KUHNOW, Bernhard F. L., Charge of Standardization, De La Vergne Machine Co., New York
LANE, Robert S., Assistant Engineer, Interborough Rapid Transit Co., New York
LEE, Robert J., Vice-President, Kings Manufacturing Co., Inc., New York
LONEY, Neil McI., Vice-President, Thompson-Starrett Co., New York
NISHIMURA, Hatsutaro, Commercial Engineer, Suzuki & Co., New York
PINGER, Roland W., Major, Ordnance Department, U. S. Army, Watervliet Arsenal Watervliet
REDMOND, Clifton G., Engineer, Rupert M. Gay Co., New York
REID, John, President, John Reid & Co., Inc., New York
RUSSELL, William F., Performance Engineer, U. S. Shipping Bd. Emerg. Fleet Corpn., New York
SCHWARTZ, Arnold A., President, Schwartz, Seymour & Co., Inc., New York
SMEND, William C., Consulting Engineer, Federal Sugar Refining Co., New York
SMITH, Jesse E., Engineer in charge of Estimating, Foamite Firefoam Co., New York
STOECHER, Otto C., Ch. Draughtsman & Field Eng., Am. Hard Rubber Co., New York
STOUT, John D., District Manager, Terry Steam Turbine Co., New York
SUMMERS, Robert G., Machine Operator, Ritter Dental Co., Rochester
TYLER, Robert F., Chief Engineer, I. B. Kleinert Rubber Co., College Point
VOORHEES, Lee J., Experimental Engineer, American Ever Ready Works, Long Island City
WEISZ, Martin, Foamite Firefoam Co., New York
WELCH, Walter P., Assistant Manager of Sales, Combustion Engineering Corpn., New York
WILDERMANN, Rudolf F. M., Ex. Engineer, General Engineering & Supply Co., New Yor
WURSTER, William F., Special Sales Engineer, Green Fuel Economizer Co., Beacon
YATES, Raymond F., Associate Editor, Modern Publishing Co., New York

North Carolina

BOLLING, Bartlett, Jr., General Superintendent, Steam Plants, Southern Power Co., Charlotte

Ohio

ALEXANDER, Carleton E., Tester, Cleveland Electric Illuminating Co., Cleveland
BERGSTROM, Adolf G., Sales Engineer, Ingersoll-Rand Co., Cleveland
BEYER, Benjamin W., Jr., Assistant to Planning Supt., The Lunkenheimer Co., Cincinnati
CHRISTMAN, John N. H., Assistant to Chief M. E., City Water Department, Cleveland
JENNINGS, Hal K., Assistant Power Engineer, Firestone Tire & Rubber Co., Akron
LOONEY, Earl A., Test Engineer, Cleveland Electric Illuminating Co., Cleveland
MOULDER, A. W., Chief Engineer, Grinnell Co., Inc., Warren
SCHNEIDER, Philip J., Half Owner and Manager, American Tool & Manufacturing Co., Urbana
WOOD, Harold B., Manager, New York Office, Jeffrey Manufacturing Co., Columbus

Oklahoma

CROCKETT, Robert B., Superintendent of Construction, Gypsy Oil Co., Tulsa

Pennsylvania

BOWNE, Charles N., William Sellers & Co., Inc., Philadelphia
BURNHAM, Leland F., Assistant Mechanical Engineer, R. D. Nuttall Co., Pittsburgh
CARULLA, Robert, Head Draftsman, John Wilson Brown, Philadelphia
CLARKE, Eugene C., Assistant Engineer, Chambersburg Engineering Co., Chambersburg
CROWLEY, Henry J., General Manager, The American Railways Co., Philadelphia
DE MAY, John A., Designer, Westinghouse Electric & Manufacturing Co., East Pittsburgh
DISSTON, William D., Assist. to V.-P., H. Disston & Sons, Inc., Tacony, Philadelphia, (Reinstate'nt)
DUFFY, James T., Jr., Industrial Engineer, Ingersoll-Rand Co., Easton
FERGUSON, Harry, Technical Engr., Operating Dept., Pennsylvania Power & Light Co., Allentown
GREENE, Elliott, New England Manager, H. S. B. W., Cochrane Corpn., Philadelphia
KERR, S. Logan, I. P. Morris Dept., William Cramp & Sons Ship & Engine Building Co., Philadelphia
KING, Marvin E., Heating Engineer, Philadelphia Rapid Transit Co., Philadelphia
KOLB, Merle A., Chester
LEARY, William H., General Superintendent, Eddystone Plant, The Baldwin Locomotive Works, Eddystone
LYTLE, Leon S., Draftsman, George L. Campbell Co., Philadelphia
MORE, William S., Mechanical Engineer, Bethlehem Steel Co., Bethlehem
NEUBER, Samuel T., Pyrometer Repairer, Frankford Arsenal, Bridesburg
PUMPURS, Arthur J., Master Mechanic, Beaver Falls Art Tile Co., Beaver Falls
ROSS, Charles W., Engineer, R. H. Beaumont Co., Philadelphia
SCOTT, J. Frew, Technical Assistant Supt. Power Stations, Duquesne Light Co., Pittsburgh
SMITH, Harold J., Sales Engineer, Mathews Gravity Carrier Co., Ellwood City
STOUT, Lloyd M., Mechanical Engineer, Robert L. Latimer & Co., Philadelphia
THOMPSON, George F., Chief Engineer, National Shipping Corpn., Philadelphia
TULEY, Charles B., Junior Engineer, Condenser Engine Department, Westinghouse Electric & Manufacturing Co., South Philadelphia
WENTZEL, Franklin, Jr., Fuel Engineering, United States Bureau of Mining, Pittsburgh
WILSON, John G., Plant Engineer, Cedar Hollow Plant, Charles Warner Co., Devault

Philippine Islands

HOGAN, Curt L., Chief Engineer, Hawaiian Philippine Co., Silay, Negros, Occidenta

South Carolina

McPHERSON, John A., Chief Engr., Plan & Const. Dept., J. E. Sirrine & Co., Greenville

Tennessee

KRAEHENBUEHL, John O., Instructor, University of Tennessee, Knoxville
SINGER, Alexander P., Superintendent, Electric Station, Memphis Gas & Electric Co., Memphis
WHALEY, William, General Manager, Myers-Whaley Co., Inc., Knoxville

Texas

BERKLEY, William E., Student, University of Texas, Austin
BROWN, Louis A., Jr., Assistant Engineer, Pierce Oil Corpn., Fort Worth
GALLAGHER, John S., Engineer, The Texas Co., Port Arthur
WEEKS, Charles R., Assistant Engineer, Anderson Clayton & Co., Houston

Virginia

RASCHE, William H., Prof. of Mechanism and Descriptive Geom., Virginia Poly. Inst., Blacksburg

Washington

DICKINSON, M. H., Pacific Coast Manager, Lidgerwood Manufacturing Co., Seattle

West Virginia

LEEDS, John J., Production Engineer, Tirometer Valve Corpn., Charleston

Wisconsin

BLIXT, Edward F., Sales Engineer, Allis-Chalmers Manufacturing Co., Milwaukee
HUDDLESTON, Robert E., Sales Manager, Giddings & Lewis Machine Tool Co., Fond du Lac
RUTZ, Will E., Chief Draftsman, Rex Typewriter Corpn., Fond du Lac
SCHMIDT, Albert R., President and Engineer, A. R. Schmidt Electric Co., Milwaukee
WALLINGFORD, James S., The Four Wheel Drive Auto Co., Clintonville

Canada

CROCKRAM, William, Toolmaker, Canadian General Electric Co., Peterborough, Ont.
SPRADBROW, N. H. G., Chief Draughtsman, Canadian Rumely Co., Ltd., Toronto, Ont.

Cuba

RENFREW, David, Chief Mechanical Draftsman, United Railways of Havana, Havana

India

ELDREDGE, Mark, Superintendent of Power, Ludlow Jute Co., Ltd, Calcutta
SHARPE, James H., Assistant Superintendent, Blast Furnace Construction, Indian Iron & Steel Co., Ltd., Asanol, E. I. R.

Mexico

FOREMAN, Ira, Draftsman Mexico Tramways Co., Mexico City

Sweden

KARNEKULL, Karl O., Manager, Aktiebolaget Industribyran, Stockholm
MORIN, Einar, Superintendent, Aktiebolayet Bofors, Bofors
NORDIN, John A., Works Manager, S. T. A. L. Turbine Co., Finspong

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Nebraska

HANEY, Jiles W., Associate Professor, Mechanical Engineering, University of Nebraska, Lincoln

Philadelphia

BEAUMONT, Robert H., President, R. H. Beaumont Co., Philadelphia

PROMOTION FROM ASSOCIATE MEMBER

Connecticut

DOOLITTLE, Warren P., Chief Designer, United States Rubber Co., New Haven

Delaware

HOMEWOOD, William T., Design Engineer, E. I. du Pont de Nemours Co., Wilmington

Illinois

VOLKMAR, Walter H., Superintendent, Emerson-Brantingham Co., Implement Works, Rockford

Massachusetts

DANIELS, Clarence W., Plants Engineer, Norton Co., Worcester
OSLER, H. Frank, Manager of Production, The Harley Co., Springfield

Michigan

PARKS, Burritt A., Consulting Engineer, Byron E. Parks & Son, Grand Rapids

New York

DENSE, John C., Chief Draftsman and Tool Designer, Willys-Morrow Co., Elmira
DOKE, George E., Engineer of Tests, New York Central Railroad Co., New York
FIELD, Crosby, Engineering Manager, National Aniline & Chemical Co., New York
FORSYTHE, Clayton E., Chief Engineer, The Willys-Morrow Co., Elmira
McKENZIE, John C. S., Chief Operating Engineer, Foster Marine Boiler Corpn., New York
STUBER, Adolph, Assistant to General Manager, Camera Works, Eastman Kodak Co., Rochester

North Carolina

DANA, William J., Associate Professor, M. E., North Carolina State College, Raleigh
VAUGHAN, Lillian L., Professor, M. E., North Carolina State College, Raleigh

Pennsylvania

BUCK, Turney E., Engineer, United Engineering & Foundry Co., Pittsburgh
JOHNSON, Edmund R., Chief Engineer, Haslett Spiral Chute Co., Philadelpha.

Wisconsin

ROCKWELL, Willard F., President and General Manager, Wisconsin Parts Co., Oshkosh

PROMOTION FROM JUNIOR

Indiana

TEETOR, R. R., Engineer, Indiana Piston Ring Co. Hagerstown

New York

COZZENS, Henry A., Jr., Mechanical Engineer, American Hard Rubber Co., New York
KING, Marcello A., Assistant Chief Engineer, Kerr Turbine Co., Wellsville
LYNE, Lewis F., Jr., President & General Manager, Oil Specialties & Supply Co., New York
WEBSTER, Edward S., Designing Engineer, Troy

Pennsylvania

BUCHANAN, D. Dwight, Jones & Laughlin Steel Co., Pittsburgh
ROBERTS, Chapin, Sears, Roebuck & Co., Philadelphia
WEAVER, James R., Assistant Works Mechanical Engineer, Westinghouse Electric & Manufacturing Co., East Pittsburgh
ZIMMERMANN, William F., Mechanical Draftsman, Kingsbury Machine Works, Philadelphia.

Virginia

BUDWELL, Leigh, Mechanical Engineer, Richmond, Fredericksburg & Potomac Railroad Co. Richmond

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In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers. Publication Office 207 Church St., Easton, Pa. Headquarters of the Society, 29 West 39th St., New York

Vol. 43, No. 8 — A.S.M.E. AFFAIRS — August, 1921

13 CORRESPONDENTS APPOINTED TO DATE

Local Sections Coöperating With Publication Committee to Increase Service

In accord with its desire to increase the service value of MECHANICAL ENGINEERING, the Publication Committee has asked the coöperation of the various Local Sections in the appointment of correspondents.

The duty of a correspondent will be to establish local contacts between the publication staff and the membership to insure the conduct of an editorial policy that will give the greatest satisfaction to the entire membership.

The correspondents appointed to date are as follows:

Akron, R. R. Jones (Temporary)
Birmingham, R. H. Cunningham
Bridgeport, Arthur R. Parker
Central Penna., Robert N. Miller
Colorado, Hyman Levine
Hartford, W. D. Halsey
Mid-Continent, E. F. Schmidt—J. P. Calderwood
Minnesota, DeWitt C. Ruff
New Orleans, W. B. Moses
Providence, J. E. Bullard
Toledo, George W. Emery
Utica, Dempster Lewis
Waterbury, Sherburne Rockwell—James R. Sheldon.

It is anticipated that the list of appointments will be completed in the near future except in the larger cities, where no effort has been made to appoint correspondents.

This new means of coöperation between the Local Sections and the publications of the Society will afford an avenue for the comments of the membership, with a consequent strengthening of MECHANICAL ENGINEERING. The increasing activity of the Society will also be more effectively mirrored in the publications.

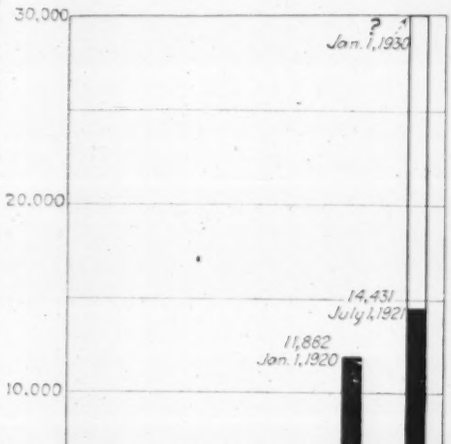
RAILROAD DIVISION TO COÖPERATE WITH SECTIONS

The Railroad Division is desirous of coöperating with the Local Sections by assisting in the preparation of programs and the selection of speakers on railroad topics so far as this may be possible and desired. The Division can arrange to furnish papers covering in a general way the design of locomotives, rolling stock or other mechanical equipment of railroads, or special papers on locomotive boilers, valve gears, superheaters, stokers, etc., and would greatly appreciate an opportunity to work with any local section contemplating a meeting with topics relating to railroads.

A ballot for the election of a Nominating Committee to present nominations next year for membership on the Executive Committee of the Division has resulted in the election of the following members: Geo. M. Basford, W. L. Bean, and Kenneth Rushton.

ORDNANCE DIVISION TO MEET AT ABERDEEN IN OCTOBER

The Ordnance Division of the Society will meet with the Society of Automotive Engineers and the Army Ordnance Association on Friday, October 7, at the Aberdeen Proving Grounds, Aberdeen, Md. The program, not yet developed in detail, will include inspections of the shops and storehouses, firing of small arms, including tracer bullets from machine guns, firing of mobile guns, and demonstrations of the great variety of tractors and field and seacoast artillery tested at the Proving Grounds.



A.S.M.E. Membership at Intervals of Ten Years

WORK STARTED ON PROGRAM FOR 1921 ANNUAL MEETING

Management Division to Have Charge of Keynote Session on Elimination of Waste

The general topic of the 1921 Annual Meeting will be Elimination of Waste in Industry. The opening or keynote session will be under the auspices of the Management Division and the program will consist of noteworthy addresses by men prominent in public affairs who will point out the fundamental importance of waste elimination not only to industry but to the entire economic structure of the country.

The various professional divisions will contribute definite technical suggestions as to methods of eliminating waste in their particular fields of industry. In order to properly present the wealth of material relating to this important subject, it is planned to start the meeting on Monday, December 5, extending it through to Friday noon December 9. Work has been started on the programs for the various professional divisions and the papers will be ready well in advance of the meeting.

NEW CONSTITUTION UP FOR DISCUSSION

New Statement of Principles to be Referred to Members for Further Comment

Since the inception of the Committee on Aims and Organization of the Society's policy and activities some four years ago, various groups of members and committees have shared in the realization that our Society has now a new vision and should have a correspondingly restated Constitution, and that we could also simplify and unify the work of the varied elements within the Society to much better advantage were our document revised systematically.

As a matter of fact, the general policy of the Society is a very definite, yet progressive, thing, although naturally the potential of our present membership of over 14,000 is something very different from what it was, say, seven years ago when we had just half that number of members.

Opportune Time for New Constitution

The last four years having brought out so much revision of thought regarding the Constitutional provisions, for the most part due to the practically complete democratization of the Society during that period, it seemed to the Council this year that the time was opportune to undertake a complete statement of the administration of our policy, and it therefore instructed the Committee on Constitution and By-Laws to prepare the necessary articles (to be introduced as amendments to the existing document). This the Committee did, and its well-prepared, although necessarily preliminary, report was presented to the Society at the Business Meeting in Chicago on May 21.

The outcome of the presentation was that after three hours' discusion of the new statement of principles, the report—the Proposed New Constitution—was ordered referred to the membership as a whole for further discussion and comment.

Schedule to be Followed

The Proposed New Constitution is therefore published in this section of MECHANICAL ENGINEERING, (page 91), together with an abstract of the discussion thereon at the Business Meeting. Reprints will be made and copies distributed to each of the Local Sections with the urgent request that they devote their October and, if necessary, other fall meetings to fuller discussion, and *propose definite suggestions on each policy enunciated in the report.* Every member may thus contribute to the development of a greater Society and one increasingly devoted to the advancement of the profession. All suggestions are to be sent to the Committee on Constitution and By-Laws, which will meet and correlate them, together with whatever additional discussion may be brought out as a result of the publication of the new proposal in this issue of MECHANICAL ENGINEERING. Then finally the Constitution and By-Laws Committee will frame and present at the Annual Business Meeting at New York next December definite motions, upon each of which the Society can vote.

In this way the sentiment of the entire member-

ship will be brought out completely previous to the Business Meeting in New York, and the matter having been fully digested in advance, the taking of the second step—that of voting to submit the new Constitution to letter-ballot of the membership in March 1922—will be greatly facilitated.

The discussion of the new Constitution presented by Morris L. Cooke at the Spring Meeting appears in Section One of this issue, page 538, as a special article.

THE SECRETARY'S LETTER

Sufficient Foundations Laid for Optimism but Each Individual's Help is Needed

With the state of war declared at an end, economies of every kind being introduced into the conduct of the Government and business generally, with a Disarmament Conference enthusiastically undertaken to still further reduce burdens by reducing taxes, both corporate and individual, with plans on foot for assisting the railroads, and refunding the loans of this country to foreign governments, it would seem as if there had been sufficient foundation laid for optimism.

In an analytical statement of world conditions made by Mr. Herbert Hoover on July 12, at the National Shoe and Leather Exposition in Boston, the speaker said:

> If we analyze the effect of these forces on the market for our manufactured goods, either in Europe, or in our own much larger market outside of Europe, we quickly find two directions in which we occupy a position of some security. The first is in those exports of lower production costs which are the result of great repetitive production, which has its firm root in our enormous consumption. The second is in that large number of special manufactures in which the inventive genius and skill of our people have been developed beyond any country in the world.

Every individual can help in sharing in this optimism, and help turn the tide, which every one is sure when it does turn is going to develop years of greater prosperity than the nation has ever known.

In the meantime there is another essential. Your Secretary is also Chairman of the Committee directing the Employment Service of The Federated American Engineering Societies. We have on file an extraordinary list of men of attainment in almost every field, and it is the duty of every one to advertise this free service to every industry, and to assist industry to strengthen its staffs with selected men, and obviously to assist these men, seeking positions, to again undertake gainful work.

Even if you yourself are not undertaking extensions to your plant or your staff, you may know of some one who is, and it will greatly assist if you will advise the Engineering Societies' Employment Service.

CALVIN W. RICE, *Secretary.*

CONSULTING ENGINEERS' LISTING FORMS READY

For 1921 Volume of Condensed Catalogues

Listing forms for the Directory of Consulting Engineers in the forthcoming volume of A.S.M.E. Condensed Catalogues are about to be sent out to those members on record as actively engaged along consulting lines. Those members so engaged, and not receiving this form, are invited to write to the Society for blanks. It is desired that all the specialized lines of practice be indicated so that the Directory may be of maximum service. The coöperation of the members to this end will be welcomed.

ENGINEERING SOCIETIES OF PHILADELPHIA HOLD OUTING

A joint outing of the A.S.M.E., A.I.E.E. and the Illuminating Engineering Society was held at McCall Field on June 17, through the courtesy of the Philadelphia Electric Co. The afternoon was given over entirely to sports, the A.S.M.E. team winning the baseball game with a score of 28 to 11, and the golf trophy, with a total of sixteen men playing, with an average of 97 for 18 holes. In the evening, brief addresses were made by John P. Mudd and Philip H. Chase.

A petition was circulated and unanimously signed by those members of the A.S.M.E. in attendance, presenting to the Governor of Pennsylvania, the name of Dr. Robert H. Fernald, Professor-in-Charge of the Department of Mechanical Engineering at the University of Pennsylvania and Vice-President of the A.S.M.E., for consideration as one of the appointees to be made by the Governor to the recently created Board for Registering Professional Engineers and Land Surveyors in the Commonwealth of Pennsylvania.

MANAGEMENT DIVISION ELECTS NEW EXECUTIVE COMMITTEE

The Management Division announces the election of a new executive committee for the year 1921–22 as follows: Messrs. L. W. Wallace, F. B. Gilbreth, R. A. Wentworth, W. H. Greul and L. P. Alford who, as chairman of the retiring executive committee serves another year in accordance with the rules for professional divisions. The chairman of the new executive committee will be chosen by the members from their own number at an organization meeting soon to be called.

THE 1921 YEAR BOOK

It is planned to issue the 1921 Year Book in December. In order to have the correct names and addresses of the members appear in this book, any changes in address or changes in the present year book should be sent in to the Secretary by September 1. New members should have their applications in by August 16 in order to have the names appear in the September issue of MECHANICAL ENGINEERING, receive action by the Council on October 3, and be included in this issue of the Year Book.

Recent Section Meetings

Atlanta. June 14. At Daffodil Tea Room. Report of the Section's activities during the past year.

Baltimore. July 8. Joint meeting of the Engineers' Club of Baltimore, A.A.E., American Chemical Society, A.I.E.E., A.S.M.E. and A.S.C.E. at the Engineers' Club. Subject: Industrial Alcohol and Its Proposed Restrictions; Industrial Alcohol Production, by Dr. M. C. Whitaker, pres. U. S. Industrial Chemical Co.; Alcohol in Chemical Industries, by Dr. Charles H. Herty, editor, *Journal Industrial and Engineering Chemistry;* Alcohol as a Household Necessity, by R. H. Bond, vice-president, McCormick & Co.

Cincinnati. June 16. Joint meeting held with the A.S.C.E., A.I.E.E. and the American Society for Steel Treating. Subject: Modern Developments in Wireless Telegraphy and Telephony, demonstrated with an up-to-date apparatus, by Lieut. Harry F. Breckel, vice-president, The Precision Equipment Co., Cincinnati, Ohio.

Connecticut State:

New Haven. June 15. At the Mason Laboratory, Yale University. Motion pictures of the Bantam Ball Bearing Co.

July 15. Summer outing at Double Beach. Games, dancing, dinner and an entertainment were participated in.

Detroit. June 18. Joint meeting with the University of Michigan Student Branch at Barton Hills Country Club. Dean M. E. Cooley, Prof. J. C. Parker and Prof. A. E. White addressed the meeting. Following the meeting a visit was made to the Barton Dam & Power House and the University of Michigan Power House.

Erie. June 7. Regular meeting with election of officers.

Los Angeles. June 17. Subject: Ancient and Modern Engineering in India and Ceylon, by R. W. Lawton.

Committee Meetings

Management Division, executive committee, on June 6. Next meeting expected to be held on September 12.

Standardization and Unification of Screw Threads, section committee under the A.E.S.C., on June 9.

Ordnance Division, executive committee, on June 15.

Gas Power Division, executive committee, on June 16.

Standardization of Gears, sectional committee under the A.E.S.C., on June 23.

Power Test Code Committee on Hydraulic Power Plants, June 23–24.

Mechanical Transmission of Power, sectional committee under the A.E.S.C., on July 7–8.

Standardization of Shafting, sub-committee on Tolerances for Transmission Shafting, on July 14.

Finance Committee, on July 28.

Budget Conference, on July 29. Finance Committee with chairmen of the Standing Committees of the Society.

Meetings and Program Committee, on August 15.

Membership Committee, meetings held weekly.

Necrology[1]

AUBREY G. ROBB, chief engineer and superintendent of the Robb Engineering Works, Ltd., Amherst, N. S., Canada, died suddenly on June 20, 1921, from blood poisoning. Mr. Robb was born on October 4, 1870, in Amherst. He was educated in his home schools and attended the Massachusetts of Technology for one year. From 1891 to the time of his death he was associated with the Robb Engineering Works which had been established by his father in 1865. He became a member of the Society in 1902.

JOSEPH W. PETERS, sales engineer, Reeves & Skinner Machinery Co., St. Louis, Mo., died on December 15, 1920. Mr. Peters was born in St. Louis on December 17, 1886. He was educated in the city schools and later received his L.L.B. and D.P.L. from Georgetown University. He was formerly connected with the Geologic Survey as junior chemist and expert computer. He also held the position of secretary of the Engineers' Club of St. Louis. During the war he served as First Lieutenant Signal Aviation and was in charge of the 335th Aero Squadron, serving overseas. Mr. Peters became an associate-member of the Society in 1920.

HAROLD W. STEDMAN, superintendent of substations for the Ohio Power Co., Newark, Ohio, was accidentally killed on June 10, 1921, while investigating trouble in a substation of Shawnee, Ohio. Mr. Stedman was born in Waterbury, Conn., on November 28, 1895. He was a graduate of Pratt Institute, Brooklyn, and was formerly assistant chief electrician of the Chase Metal Works, Waterville, Conn. He became a junior member of the Society in 1917.

[1] For details of the professional careers of deceased members, see necrology section of the forthcoming issue of the Transactions of the Society.

Proposed New Constitution, By-Laws and Rules

THE Constitution provides that amendments to it may only be introduced at the Semi-Annual Business Meetings of the Society. Favoring a recommendation of the Committee on Constitution and By-Laws that many provisions of the Constitution need revision, the Council instructed this Committee to present amendments at the Spring Meeting in Chicago, May 1921.

Although revision of the Constitution introduces the necessity for revision of the By-Laws and Rules, the legal requirements were met by introducing at the Chicago Meeting Amendments to the Constitution only.

Below are printed in parallel arrangement (*a*) the present Constitution, (*b*) the proposed new Constitution and (*c*) a brief digest of the discussion on the proposals on the floor of the Business Meeting in Chicago.

Preamble to Report Submitted in Chicago

(Opinion of the Committee on Constitution and By-Laws)

DETERMINATION OF WHAT SHALL GO INTO THE NEW CONSTITUTION

Name of the Society, Object and Government. These remain practically the same as when the Society was organized nearly half a century since, except that the objects are broadened to be more in keeping with the present concept of engineering.

Membership. Two essential considerations are involved here:

(*a*) Grades of membership.

(*b*) Requirements for admission to the several grades.

The age limit has been removed from the requirements for admission to the grades of Member and Associate-Member since it has no necessary relation to the qualifications of the engineer.

For the sake of clarity the name of "Associate" has been changed to "Affiliate."

The grade of Junior Member has been eliminated, and a year's experience taken from the requirements for Associate-Member.

A new proposal for young men above the age of eighteen, to be called Juniors, bridges the present undesirable gap between members of Student Branches and membership in the Society, and provides a continuous association of the young man with the Society from the earliest stages of engineering to the highest grade of membership.

The transition from the present to the new requirements for membership can be provided for in special By-Laws.

Certain obligations of members should be retained in the Constitution

Initiation Fees and Dues. Understanding that the Council has had under advisement the matter of an increase in dues, and in the light of the above proposal to abolish the Junior-Member grade, the Committee has tentatively inserted a figure of twenty dollars ($20) dues for the Member grade. No other change has been inserted.

The Committee does, however, raise the question as to whether the amounts of the initiation fees and dues should be retained in the Constitution or transferred to the By-Laws. If transferred the amounts would be subject to the action of the Council.

Officers. According to the Charter of the Society the number of officers must be twenty-two (22), and the new proposal takes this into account.

The subdivision of the Society into Local Sections and Professional Divisions makes it advisable to consider the benefit which would accrue if these groups were represented in the personnel of the Council.

Council. The Council exercises its prerogatives regularly and effectively, and no particular changes seem to be required.

Committees of the Council. The present Constitution contains several articles relating to committees. Since all these committees are under the Council, all such matters can be transferred to the By-Laws, retaining in the Constitution only the present general statement that the Council may appoint and have supervision over committees.

General Meetings. Provision already exists for Annual Meeting, Semi-Annual Meeting, and Special Meetings of the Society.

Certain details, such as quorum at General Meetings; presentation, discussion and printing of papers, etc., can be transferred to the By-Laws or Rules.

Groups Within the Society. Provision already exists for the formation of Professional Divisions and Geographical Sections, and this classification promises to take care of both territorial and professional interests of the members.

Transactions. Provision already made. Needs no particular change.

Secretary. Provision already made, but certain detailed duties can be transferred to the By-Laws.

Funds. It is a legal requirement that provision must be made for depositing permanent funds.

Existing articles on permanent funds and on expenditures of income from funds are collected under one heading of "Funds."

Professional Practice. The fundamental principles regarding professional practice, of both members and Society, are collected under this head.

Amendments. An excellent provision for making amendments to the Constitution is now before the Society, and is incorporated in the suggested Constitution.

Matters Transferred to By-Laws or Rules. The subject-matter of the Articles contained in the present, but omitted from the proposed, Constitution is to be considered and employed in the new By-Laws and Rules. For information the omitted articles are appended to this proposed Constitution.

Respectfully submitted,

Committee on Constitution and By-Laws,

JOHN L. HARRINGTON, *Chairman*, Kansas City,
ERNEST L. OHLE, St. Louis,
JAMES E. SAGUE, New York,
ROBERT I. CLEGG, Chicago,
ARTHUR L. RICE, Chicago.

May 23, 1921.

Present and Proposed Constitutions, with Discussion Thereon at Chicago

PRESENT CONSTITUTION	PROPOSED NEW CONSTITUTION	DISCUSSION AT CHICAGO
	ARTICLE 1—NAME AND GOVERNMENT	
C-1 The title of this Society is "The American Society of Mechanical Engineers."	Sec. 1 The title of this Society is "The American Society of Mechanical Engineers."	No discussion of this article
C-3 The Society shall be governed by this Constitution and by By-Laws and Rules in harmony therewith.	Sec. 2 The Society shall be governed by this Constitution and by By-Laws and Rules in harmony therewith.	
C-4 The Society was organized as a Corporation under the laws of the State of New York, April 7, 1880. Its offices shall be located in the City of New York.	Sec. 3 The Society was organized as a Corporation under the laws of the State of New York, April 7, 1880. Its principal offices shall be located in the City of New York.	
	ARTICLE 2—OBJECTS	
C-2 The object of the Society is to promote the arts and sciences connected with engineering and mechanical construction. The principal means for this purpose shall be the holding of meetings for the reading and discussion of professional papers.	Sec. 1 The objects of the Society shall be: (*a*) To promote the arts and sciences connected with engineering and mechanical construction.	Revise so as to incorporate sense of preamble to Constitution of Federated American En-

Present Constitution	*Proposed New Constitution*	*Discussion at Chicago*
and for social intercourse; the publication and distribution of its papers and discussions; and the maintenance of an Engineering Library.	(*b*) To promote intercourse among engineers and with allied technologists.	gineering Societies.[1] Add to clause (*a*): "for the welfare of mankind."
	(*c*) To advance the economic status of the engineer.	Should be "socio-economic" preferably.
	(*d*) To coöperate with other societies in broadening the civic usefulness and advancing the standing of the profession.	
	ARTICLE 3—MEMBERSHIP	
C-6 The membership of the Society shall consist of Honorary Members, Members, Associates, Associate-Members and Juniors. Honorary Members, Members, Associates and Associate-Members are entitled to vote and to hold office. Juniors are not entitled to vote nor to hold office, but are entitled to all the other privileges of membership.	Sec. 1 The membership shall consist of Honorary Members, Members, Associate-Members and Affiliates.	
C-15 All applications for membership to the grades of Member, Associate, Associate-Member or Junior shall be presented to the Council, which shall consider and act upon each application, assigning each approved applicant to the grade of membership to which in the judgment of the Council, his qualifications entitled him. The name of each candidate thus approved by the Council shall, unless objection is made by the applicant, be submitted to all the members of the Council for election, by means of a letter-ballot.	Sec. 2 Members of all grades shall be elected by the Council.	
C-13 The rights and privileges of every Honorary Member, Member, Associate, Associate-Member and Junior shall be personal to himself, and shall not be transferable or transmissible by his own act or by operation of law.	Sec. 3 The rights and privileges of every member shall be personal to himself, and shall not be transferable.	
C-7 Honorary Members, Members, Associates and Associate-Members are entitled to vote on all questions before any meeting of the Society, in person, or by a proxy given to a person entitled to vote. A proxy shall not be valid for a greater time than for six months.	Sec. 4 All members are entitled to vote on all questions which are before any meeting of the Society, in person or by a proxy given to a person entitled to vote.	Incorporate Mr. Morris L. Cooke's pending amendment, extending privilege of voting to Junior Members (carried by one vote).
C-18 Each person elected, excepting Honorary Members, shall subscribe to this Constitution, and shall pay the Initiation fee before he can be entitled to the rights and privileges of membership. If such person does not comply with this requirement within six months after notice of this election, he will be deemed to have declined election. The Council may, thereupon, declare his election void.	Sec. 5 Each person admitted to membership shall subscribe to this Constitution.	
	ARTICLE 4—QUALIFICATIONS FOR ADMISSION	
C-8 An Honorary Member shall be a person of acknowledged professional eminence. The number of Honorary members shall not exceed twenty-five at any time.	Sec. 1 An Honorary Member shall be a person of acknowledged professional eminence.	The grades proposed are a new classification, and while the discussion brought out that the new proposals were capable of improvement, it was the final opinion that some changes could profitably be made over the old system. One suggestion was: Leave the grades as they are at present, remove the age limits, add the voting privilege to Junior Members and add a grade for men between the ages of 18 and 21.
C-9 A Member shall be an engineer or teacher of applied science of thirty-two years of age, or over, and shall have been in the active practice of his profession for at least ten years and in responsible charge of important work for five years, and shall be qualified to design as well as to direct engineering work. Fulfilling the duties of a professor of engineering who is in charge of a department in a college or school of accepted standing shall be taken as an equivalent to an equal number of years of active practice. Graduation from a school of engineering of recognized standing shall be considered as equivalent to two years of active practice.	Sec. 2 A Member shall be an engineer who has been in the active practice of his profession for at least ten (10) years and in responsible charge of important work for at least five (5) years, and who is qualified to design as well as to direct engineering work. Fulfilling the duties of a professor of engineering who is in charge of a department in a college or school of accepted standing shall be taken as an equivalent to an equal number of years of active practice. Graduation from a school of engineering of accepted standing shall be considered as equivalent to two (2) years of active practice.	Delete "who is in charge of a department."
C-11 An Associate-Member shall be a professional engineer not less than twenty-seven years of age, who shall have been in the active practice of his profession for at least six years, and who shall have had responsible charge of work as principal or assistant for at least one year. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice.	Sec. 3 An Associate-Member shall be an engineer who has been in the active practice of his profession for at least five (5) years and in responsible charge of work for at least one (1) year. Graduation from a school of engineering of accepted standing shall be considered as equivalent to two years of active practice.	Elimination of existing Junior Member grade and lowering of Associate-Member requirements fail to provide for a man between the ages of 22, when he is graduated normally, and 25, when his period of apprenticeship is completed.
C-10 An Associate shall be thirty years of age or over. He need not be an engineer, but must have been so connected with some branch of engineering or science, or the arts, or industries, that the Council will consider him qualified to coöperate with Engineers in the advancement of professional knowledge.	Sec. 4 An Affiliate need not be an engineer, but must have been so connected with some branch of engineering or science, or the arts, or industries, that the Council will consider him qualified to coöperate with engineers in the advancement of professional knowledge.	The term "Affiliate" is rather awkward. The term "Intermediate Member" was suggested instead of "Associate-Member," making it possible to retain the term "Associate" in its present sense.
	Sec. 5 A person must have reached the age of twenty-one (21) to be eligible for membership.	
	Sec. 6 A Junior shall be a person not under eighteen years of age who is engaged in the study or practice of engineering. He may continue as a Junior until he can comply with the requirements for admission as an Associate-Member. The amount of his contribution to the funds shall be as specified in the By-Laws.	
	ARTICLE 5—FEES AND DUES	
C-19 The initiation fee for membership in each grade shall be as follows: For Member ..... $25 For Associate ..... 25 For Associate-Member ..... 25 For Junior 15	Sec. 1 The initiation fee for membership in each grade shall be as follows: For Member ..... $25 For Associate-Member ..... 25 For Affiliate 25	There was a discussion as to whether the amounts of the initiation fees and dues should be retained in the Constitution or transferred to the By-Laws, and it was decided that they should be retained.

[1] The preamble referred to in the discussion reads as follows: "Engineering is the science of controlling the forces and of utilizing the materials of nature for the benefit of man, and the art of organizing and of directing human activities in connection therewith.

"As service to others is the expression of the highest motive to which men respond and as duty to contribute to the public welfare demands the best efforts men can put forth, Now, THEREFORE, the engineering and allied technical societies of the United States of America through the formation of The Federated American Engineering Societies, realize a long-cherished ideal—a comprehensive organization dedicated to the service of the community, state and nation."

Present Constitution	*Proposed New Constitution*	*Discussion at Chicago*
C-21 The annual dues for membership in each grade shall be as follows: For Member..... $15 For Associate..... 15 For Associate-Member..... 15 For Junior..... 10 for the first six years of his membership and thereafter the same as for an Associate-Member.	Sec. 2 The annual dues for membership in each grade shall be as follows: For Member..... $20 For Associate-Member..... 15 For Affiliate..... 15	The opinion of the meeting was that the dues should not be increased.
C-20 A Junior, on promotion to any other grade of membership, shall pay an additional fee of $10.		
C-22 The Council may, in its discretion, permit any Member, Associate or Associate-Member to become a Life-Member in the same grade, by the payment at one time of an amount sufficient to purchase from the Equitable Life Assurance Society of New York, an annuity on the life of a person of the age of the applicant equal to the annual dues in his grade. Such life-member shall not be liable thereafter for annual dues.	Sec. 3 The Council may permit any Member, Associate-Member or Affiliate to become a Life-Member in the same grade, as specified in the By-Laws.	
C-23 The Council shall have the power, by letter-ballot, to admit to Life-Membership, without the payment of a life-membership fee, any person who, for a long term of years, has been a member, an Associate or an Associate-Member when, for special reasons, such procedure would in its judgment promote the best interests of the Society, provided that notice of such proposed action shall have been given at a previous meeting of the Council. One dissenting vote shall defeat such admission.	Sec. 4 The Council may remit the dues of any member for any special reason, as provided in the By-Laws.	
	ARTICLE 6—OFFICERS	
C-26 The affairs of the Society shall be managed by a board of directors chosen from among its Members, Associates, and Associate-Members, which shall be styled "The Council." The Council shall consist of the President of the Society, who shall be the presiding officer, six Vice-Presidents, nine Managers, the Treasurer, and the five surviving Past-Presidents who have last held office. The number of persons constituting a quorum of the Council shall be determined by the By-Laws. The Secretary may take part in the deliberations of the Council but shall not have a vote therein.	Sec. 1 The officers of the Society shall consist of a President; three (3) Vice-Presidents; the three (3) last surviving Past-Presidents; Fourteen (14) Councilors, seven (7) representing the Local Sections and seven (7) representing the Professional Divisions, and a Treasurer.	The Charter of the Society provides for 22 officers, but we could apply for an amendment if desirable. The dual representation on the Council of the Professional Divisions and the Local Sections should be given careful consideration. The Section was referred back to the Committee on Constitution and By-Laws.
C-34 The election of officers shall be by sealed letter-ballot, as the By-Laws shall provide.	Sec. 2 They shall be elected at the Annual Meeting by sealed letter-ballot of the membership, as detailed in the By-Laws.	
C-33 At each Annual Meeting there shall be elected from among the Members, Associates and Associate-Members: A President, to hold office for one year. Three Vice-Presidents, each to hold office for two years. Three Managers, each to hold office for three years. A Treasurer, to hold office for one year.	Sec. 3 The President shall be elected for one (1) year, the Vice-Presidents for three (3) years, the Councilors for two (2) years and the Treasurer for one (1) year. The elections shall take place at the Annual Meeting in New York.	
C-35 The term of all elective officers shall begin on the adjournment of the Annual Meeting of the Society. Officers shall continue in their respective offices until their successors have been elected and have accepted their offices.	Sec. 4 Rotations of office shall be as specified in the By-Laws.	
C-48 There shall be a Nominating Committee whose duty shall be to select candidates for the elective offices to be filled at each election. This committee shall be elected annually by the voting membership of the Society, other nominating committees having the same powers may be constituted by the voting Membership. The number of members, the selection, organization and procedure of all nominating committees shall be as the By-Laws shall provide.		
	ARTICLE 7—COUNCIL	
C-26 ..... The Council shall consist of the President of the Society, who shall be the presiding officer, six Vice-Presidents, nine Managers, the Treasurer, and the five surviving Past-Presidents who have last held office. The number of persons constituting a quorum of the Council shall be determined by the By-Laws. The Secretary may take part in the deliberations of the Council but shall not have a vote therein.	Sec. 1 The Council shall consist of the President, the three last surviving Past-Presidents, the Vice-Presidents, the Councilors and the Treasurer. The Chairmen of Standing Committees shall be entitled to sit with the Council, without vote.	Will be modified according to decision reached on Article 6.
C-29 The Council shall regulate its own proceedings, and may by resolution delegate specific powers to an Executive Committee or to any one or more members of the Council. No act of the Executive Committee or of a delegate shall be binding until it has been approved by a resolution of the Council.	Sec. 2 The Council shall have full control of the activities of the Society, subject to the limitations of the Constitution.	
	Sec. 3 The Council shall prepare By-Laws governing the Society in accordance with this Constitution.	
C-29 ....., and may by resolution delegate specific powers to an Executive Committee or to any one or more members of the Council.....	Sec. 4 The Council may by resolution delegate specific powers to any member or to any committee of members.	
C-32 The Council may, by a two-thirds vote of the members present, declare any elective office vacant, on the failure of its incumbent for one year, from inability or otherwise, to attend the Council meetings, or to perform the duties of his office, and shall thereupon appoint a Member, Associate or Associate-Member to fill the vacancy until the next Annual Meeting. The said appointment shall not render the appointee ineligible to election to any office.	Sec. 5 The Council shall have power to fill vacancies in its membership by appointment until the next election of officers, as specified in the By-Laws.	
C-28 Should a vacancy occur in the Council, or in any elective office except the Presidency, through death, resignation or other cause, the Council may elect a Member, Associate or Associate-Member to fill the vacancy until the next annual election.		
C-30 The Council shall present at the Annual Meeting..... .... shall be entered in the minutes of the proceedings of the Annual Meeting.	Sec. 6 The Council shall present at the Annual Meeting of the Society a report verified by the President or Treasurer or by a majority of the members of the Council, showing the whole amount of real and personal property owned by the Society, where located, and where and how invested, and the amount and nature of the property acquired during the year immediately preceding the date of the report, and the manner of the acquisition; the amount applied, appropriated or expended during the year immediately preceding such date, and the purposes, objects or persons to or for which such applications, appropriations, or expenditures have been made; also the names and places of residence of the persons who have been admitted into membership in the Society during the last year, which report shall be filed with the records of the Society, and an abstract thereof shall be entered in the minutes of the proceedings of the Annual Meeting.	
C-26 .....The number of persons constituting a quorum of the Council shall be determined by the By-Laws.	Sec. 7 The number of persons constituting a quorum of the Council shall be as determined in the By-Laws.	

Present Constitution	*Proposed New Constitution*	*Discussion at Chicago*
	ARTICLE 8—GENERAL MEETINGS	
C-40 The Society shall hold two meetings in each year. The Annual Meeting shall begin in New York City on the first Tuesday in December, and a Semi-Annual Meeting shall be held at such time and place as the Council may appoint. Fifty persons entitled to vote shall constitute a quorum for the transaction of business.	Sec. 1 The Annual Meeting of the Society shall begin in New York City on the first Tuesday in December for the annual election of officers, but may be adjourned to any other city, as provided in the By-Laws.	Should define clearly what a "General Meeting" is.
C-40 ....., and a Semi-Annual Meeting shall be held at such time and place as the Council may appoint. Fifty persons entitled to vote shall constitute a quorum for the transaction of business	Sec. 2 The Semi-Annual Meeting shall be held at such time and place as the Council may appoint.	
C-41 Special meetings of the Society may be called at any time at the discretion of the Council, or shall be called by the President upon the written request of fifty persons entitled to vote, the notices of such meeting to state the business for which such meeting is called and no other business shall be entertained or transacted at that meeting.	Sec. 3 A special meting of the Society shall, at the discretion of the Council, be held at any time and place upon the written request of one hundred (100) members. The call for the meeting shall state the business for which it is called, and no other business shall be transacted.	Delete "at the discretion of the Council."
	Sec. 4 The number of members constituting a quorum at a meeting of the Society shall be as determined in the By-Laws.	
	Sec. 5 An action of a general meeting shall be deemed an action of the Society as a whole.	
	ARTICLE 9—SECTIONS AND DIVISIONS	
C-52 The Council may, in its discretion, authorize the organization of sections or groups of any or all grades of membership, for professional or scientific purposes which are in harmony with the Constitution and By-Laws of this Society. Such sections or groups may in the discretion of the Council be geographical or professional, and shall have such powers and act under such rules and regulations as the Council may from time to time prescribe.	Sec. 1 The Council may authorize the organization of local sections, composed of members of any or all grades, which shall operate under the provisions of the Constitution and By-Laws.	
	Sec. 2 The Council may authorize the organization of professional divisions, composed of members of any or all grades, which shall operate under the provisions of the Constitution and By-Laws.	
	ARTICLE 10—TRANSACTIONS	
C-53 The official record of technical papers and discussions shall be known as the Transactions of the Society, and shall be published under the direction of the Council. There may be included therein the annual report of the Council, reports of committees, and business records of the Society.	Sec. 1 The Transactions of the Society and the list of officers and members shall be published in such manner as the Council may direct.	
	ARTICLE 11—SECRETARY	
C-37 The Council, at its first meeting after the Annual Meeting of the Society, shall appoint a person of the grade of Member to serve as Secretary of the Society for one year, subject to removal for cause by an affirmative vote of members of the Council at any time after one month's written notice has been given him to show cause why he should not be removed, and he has been heard in his own defense, if he so desires. The Secretary shall receive a salary which shall be fixed by the Council at the time of his appointment. The Council may also in its discretion appoint a person of the grade of Member to be an Honorary Secretary of the Society for a term not to exceed one year, but he may be reappointed from year to year. He shall perform such duties as may be assigned to him by the Council which are in conformity with the Constitution and By-Laws, and with or without compensation as the Council may direct.	Sec. 1 At its first meeting after the Annual Meeting the Council shall appoint a member of the Society to serve for one year as Secretary of the Society.	
C-38 The President, Secretary and Treasurer shall perform the duties legally or customarily attaching to their respective offices under the laws of the State of New York, and such other duties as may be required of them by the Council.	Sec. 2 The Secretary shall perform the duties usually pertaining to this office, in accordance with the By-Laws.	Delete "usually pertaining to this office."
	ARTICLE 12—FUNDS	
	Sec. 1 The Treasurer shall deposit or invest the permanent funds of the Society in accordance with the laws of the State of New York governing the investment of trust funds.	
C-27 The Council thus constituted shall be the legal trustee of the Society. All gifts or bequests not designated for a specific purpose shall be invested by the Council, and only the income therefrom may be used for current expenses.	Sec. 2 All gifts or bequests shall be administered in accordance with the provisions of the donors. Unless the donors make other provisions, gifts or bequests shall be added to the trust funds of the Society and only the income from them shall be available for expenditures.	
	Sec. 3 All receipts from Life Membership payments shall be invested and the income only used for current expenses.	
	ARTICLE 13—PROFESSIONAL PRACTICE	
	Sec. 1 In all professional and business relations the members of the Society shall be governed by the highest principles of truth and honesty.	Is this necessary? Cannot the character of our work speak for itself?
C-50 The Society may approve or adopt any report, standard, formula or recommended practice, and may print the same in the Transactions. It shall, however, not approve any engineering or commercial enterprise.....	Sec. 2 The Society may approve or adopt any report, standard, formula, or recommended practice, and may print the same in the Transactions. It shall, however, not approve any commercial enterprise.	
C-50 .....It shall not consent to the use of its name or initials in any commercial work or business, except to indicate conformity with its standards or recommended practices.	Sec. 3 The Society shall not consent to the use of its name or initials in any commercial work or business, except to indicate conformity with its standards or recommended practices.	
	ARTICLE 14—AMENDMENTS	
C-57 At any Semi-Annual Meeting of the Society any person entitled to vote may propose in writing an amendment to this Constitution. Such proposed amendment shall not be voted at that meeting, but shall be open to discussion and to such modification as may be accepted by the proposer. The proposed amendment shall be mailed in printed form by the Secretary to each person entitled to vote, at least sixty days previous to the next Annual Meeting, accompanied by comment by the Council, if it so elects. At that Annual Meeting such proposed amendment shall be presented for discussion and final amendment and shall subsequenly be submitted to all	Sec. 1 At any General Meeting of the Society any person entitled to vote may propose in writing an amendment to this Constitution, provided that the proposer shall have secured the written signature of at least twenty members approving the proposed amendment. Such proposed amendment shall not be voted on at that meeting but shall be open to discussion and to such modification as may be accepted by the proposer. If the proposed amendment as originally written, or as changed or modified with the consent of the proposer, is again indorsed by twenty or more members, who may or may not be the original indorsers, it shall be mailed in printed form by the Secretary.	

Present Constitution	*Proposed New Constitution*	*Discussion at Chicago*
persons entitled to veto, provided that twenty votes are cast in favor of such submission. The final vote on adoption shall be by sealed letter-ballot, closing at 12 o'clock noon, on the first Monday of March following.	to each person entitled to vote, at least ninety days previous to the next General Meeting, accompanied by comment of the Council, if it so elects. Ballots shall be sent with the proposed amendment. The voting shall be by sealed ballot and the voting shall close at noon of the first day of the General Meeting following the mailing.	
C-58 The letter-ballot, accompanied by the text of the proposed amendment, shall be mailed by the Secretary to each person entitled to vote, at least thirty days previous to the closure of the voting. The ballots shall be voted, canvassed, and announced as provided in the By-Laws. The adoption of the amendment shall be decided by a majority of the votes cast. An amendment shall take effect on the announcement of its adoption by the Presiding Officer of the Semi-Annual Meeting next following the closure of the vote. Any changes in the order or consecutive numbering of existing articles of the Constitution made necessary by such adopted amendment, shall be made under the direction of the Council.	Sec. 2 The ballots shall be voted, canvassed and announced as provided by the By-Laws. The adoption of the amendment shall be decided by a majority of the votes cast. An amendment shall take effect on the announcement of its adoption by the Presiding Officer at the same General Meeting. Any changes in the order or consecutive numbering of existing articles of the Constitution made necessary by such adopted amendment, shall be under the direction of the Council.	
C-61 This Constitution shall supersede all previous rules of the Society, and shall go into effect on the announcement by the Presiding Officer of its adoption.	Sec. 3 This Constitution shall supersede all previous rules of the Society, and shall go into effect upon the Presiding Officer at a General Meeting announcing its adoption.	

Articles Omitted from the Constitution and to be Considered in Redrafting the By-Laws

C-5 Persons connected with the arts and sciences relating to engineering or mechanical construction may be eligible for admission into the Society.

C-6 .....Honorary Members, Members, Associates and Associate-Members are entitled to vote and to hold office. Juniors are not entitled to vote nor to hold office, but are entitled to all the other privileges of membership.

C-7 .....A proxy shall not be valid for a greater time than for six months.

C-8 .....
.....The number of Honorary Members shall not exceed twenty-five (25) at any time.

C-12 A Junior shall be twenty-one years of age or over. He must have had such engineering experience as will enable him to fill a subordinate position in engineering work, or he must be a graduate of an engineering school.

C-14 Honorary members shall be nominated by at least ten members of the Society. The grounds upon which the nomination is made shall be presented to the Council in writing.

C-15 .....assigning each approved applicant to the grade of membership to which in the judgment of the Council, his qualifications entitled him. The name of each candidate thus approved by the Council shall, unless objection is made by the applicant, be submitted to all the members of the Council for election, by means of a letter-ballot.

C-16 Any person desiring to change his grade of membership shall make application to the Council in the same manner as is required in the case of a new applicant.

C-17 .....Fifteen affirmative votes shall be required for the election of a candidate to membership in any grade. One negative vote shall defeat an election to Honorary Membership. Two negative votes shall defeat an election to any other grade.

C-18 .....and shall pay the initiation fee before he can be entitled to the rights and privileges of membership. If such person does not comply with this requirement within six months after notice of his election, he will be deemed to have declined election. The Council may, thereupon, declare his election void.

C-20 A Junior, on promotion to any other grade of membership, shall pay an additional fee of $10.

C-22 .....by the payment.

C-23 The Council shall have the power, by letter-ballot, to admit to Life-Membership, without the payment of a life-membership fee, any person who, for a long term of years, has been a Member, an Associate or an Associate-Member when, for special reasons, such procedure would in its judgment promote the best interests of the Society, provide that notice of such proposed action shall have been given at a previous meeting to the Council. One dissenting vote shall defeat such admission.

C-24 A person in any grade of membership who shall leave his annual dues unpaid for one year shall not receive the volume of Transactions until such arrears are paid. A person who shall leave his dues unpaid for two years shall, in the discretion of the Council, have his name stricken from the roll of membership, and shall cease to have any further rights as such.

C-25 The Council may refuse to receive the dues of any members of any grade, who shall have been adjudged by the Council to have violated the Constitution or By-Laws of the Society, or who, in the opinion of the Council by a two-thirds vote, shall have been guilty of conduct rendering him unfit to continue in its membership; and the Council may expel such person and remove his name from the list of members.

C-31 An act of the Council which shall have received the expressed or implied sanction of the membership at the next subsequent meeting of the Society shall be deemed to be the act of the Society, and shall not afterwards be impeached by any member.

C-32 The Council may, by a two-thirds vote of the members present, declare any elective office vacant, on the failure of its incumbent for one year, from inability or otherwise, to attend the Council meetings, or to perform the duties of his office, and shall thereupon appoint a Member, Associate or Associate-Member to fill the vacancy until the next Annual Meeting. The said appointment shall not render the appointee ineligible to election to any office.

C-36 A President, Vice-President, or Manager shall not be eligible for immediate reelection to the same office at the expiration of the term for which he was elected.

C-37 .....The Council may also in its discretion appoint a person of the grade of Member to be an Honorary Secretary of the Society for a term not to exceed one year, but he may be reappointed from year to year. He shall perform such duties as may be assigned to him by the Council which are in conformity with the Constitution and By-Laws, and with or without compensation as the Council may direct.

C-39 A vacancy in the office of President shall be filled by the Vice-President who is senior by age.

C-42 The expenses of all meetings of the Society and of any group or section thereof, shall be arranged in accordance with such By-Laws and Rules as the Council may from time to time adopt, provided, however, that nothing in this section shall be construed to authorize the Council to make any increase in the annual dues of members in any grade.

C-43 Any appropriation recommended by the Society at a meeting shall not take effect until it has been approved by the Council.

C-44 Every question which shall come before a meeting of the Society or of the Council or a Committee, shall be decided by a majority of the votes cast, unless otherwise provided in this Constitution or the By-Laws or the laws of the State of New York. The Council may order the submission of any question to the membership for decision by letter-ballot. Any meeting of the Society at which a quorum is present, may order the submission of any question to the membership for discussion by letter-ballot.

C-45 The Standing Committees of Administration of the Society shall be
- Committee on Finance
- Committee on Meetings and Program
- Committee on Publication and Papers
- Committee on Membership
- Committee on Local Sections
- Committee on Professional Sections
- Committee on Constitution and By-Laws

There shall be other Standing Committees of the Society as the By-Laws provide and the Council approves. The appointment, organization, duties and terms of service of all Standing Committees shall be as the By-Laws provide. The Chairmen of all Standing Committees shall have a seat in the Council of the Society, but no vote. The Secretary of the Society shall be the Secretary of each of the Standing Committees.

C-46 There shall be a John Fritz Medal Committee of four members appointed, as provided in the By-Laws.

C-47 The Annual Committees shall be:
- An Executive Committee, appointed by the Council.
- Committee of Tellers, as required by the By-Laws, appointed by the President.
- Such other committees as may be required from time to time.

C-49 Professional Committees. The Council shall have power to appoint, upon a recommendation of the Society at a general meeting, or upon its own initiative, such Professional Committees as it may deem desirable, to investigate, consider and report upon subjects of engineering interest. Any proposed expenses of such committees must be authorized by the Council before they are incurred.

C-51 Each committee shall perform the duties required of it in the By-Laws, or assigned to it by the Council. Membership on the Council or any committee of the Society shall terminate automatically on account of absence of any member, either wilful or due to force of circumstances, as provided in the By-Laws.

C-54 The Society shall claim no exclusive copyright to any papers read at its meetings, or any reports or discussions thereon, except in the matter of their official publication under the Society's imprint as its Transactions. The policy of the Society shall be to give the professional and scientific papers read before it the widest circulation possible, with the view of making the work of the Society known, encouraging engineering progress, and extending the professional reputation of its members.

C-55 The Society shall not be responsible for statements or opinions advanced in papers or in discussions at its meetings. Matters relating to partisan politics or purely to trade shall not be discussed at a meeting of the Society nor be included in the Transactions.

C-59 For the further ordering of the affairs of the Society, the Council may, by a two-thirds vote of its members present, amend the By-Laws in harmony with this Constitution, provided that a written notice of such proposed amendment shall have been given at the previous regular meeting of the Council; and provided further that the Secretary shall have mailed to each member of the Council a copy of such proposed amendment at least thirty days in advance of the meeting of the Council at which action is to be taken. The amendment shall take effect immediately on its passage by the Council. The Secretary shall at once mail a copy of such amendment to the members of all grades.

C-60 The Council may, by a majority vote of the members present at any meeting, establish, amend, or annul Rules for the conduct of the business affair, of the Society; for the ordering and conduct of its professional or business meetings; and for the guidance of its committees in their work and reports; provided that such Rules are in harmony with the Constitution and By-Laws of the Society.

New Members of the Society

The following is a list of those who have qualified for membership in the Society between the dates of June 1 and July 1, 1921. The grade is indicated by the symbol after the name; i. e., M-Member; A-Associate; AM-Associate-Member; J-Junior.

ADKERSON, Branch O.—J, West Palm Beach, Fla.
AMBLER, Halford H.—AM, Hutchinson, Kan.
ANDERSON, John F.—AM, Hartford, Conn.
ASHLEY, Robert L.—J, Millers Falls, Mass.
AWOT, Adolph W.—J, Bloomfield, N. J.

BAKER, Robert L.—AM, Boston, Mass.
BARKER, Guy A.—AM, San Francisco, Cal.
BASH, Herbert A.—AM, Buenos Aires, Argentine, S. A.
BATHURST, Arthur F.—AM, Jersey City, N. J.
BEARCE, George D.—AM, New York, N. Y.
BEAUSOLEIL, Raymond—AM, Montreal, Que., Can.
BEGEMAN, Myron L.—AM, Ann Arbor, Mich.
BENOIT, Armand Wm.—M, Boston, Mass.
BIRKEBAK, Christian A.—AM, Chicago, Ill.
BLACKBURN, Daniel McM.—AM, Carbondale, Pa.
BLAIR, J. Arthur—AM, Camden, N. J.
BOEGEHOLD, Alfred L.—AM, Dayton, Ohio
BOYNTON, Earl S.—AM, E. Orange, N. J.
BRISTOL, Benjamin H. 2nd.—J, Foxboro, Mass.
BROWNBACK, Henry Lowe—AM, Philadelphia, Pa.
BRYANT, E. J.—AM, Woonsocket, R. I.
BUCKHAM, Henry B.—J, Chicago, Ill.
BURROUGHS, Chas. W.—AM, Montreal, Que., Can.
BYERSON, Charles E.—AM, Latrobe, Pa.

CAHILL, James H.—A, Hudson, Mass.
CALHOUN, John V.—J, Philadelphia, Pa.
CAPWELL, Elmer A.—AM, Anthony, R. I.
CHASON, Daniel H.—AM, Elizabethport, N. J.
CHEEVER, Paul—M, Boston, Mass.
CHOATE, D. C.—J, Grand Forks, N. D.
CHRISTIE, Alvan B.—AM, Philadelphia, Pa.

COHEN, Emanuel M.—J, New York, N. Y.
COPP, Chas. F.—M, Akron, Ohio
CORBY, Jerome B.—A, St. Louis, Mo.

D'AIELLO, Mariano J.—J, Bayonne, N. J.
DAVIDSON, Philip L.—J, New York, N. Y.
DAVIES, Henry K.—AM, Philadelphia, Pa.
DAVIS, Emmet L.—AM, Kosmosdale, Ky.
DAY, George E.—M, Steubenville, Ohio
DEARBORN, Elbert R.—J, Cleveland, O.
DEUEL, Harry A.—M, Atlanta, Ga.
DIERCKS, Edgar—J, Chicago, Ill.
DIETERT, Harry W.—J, Lester, Pa.
DORRICOTT, Chas. W.—AM, Bethlehem, Pa.
DOUGLAS, Harold D.—AM, Honduras, Central America
DUNSCOMB, Walter S.—M, Twinsburg, Ohio
DUTTON, Robert L.—A, E. St. Louis, Ill.
DWINELL, Charles A.—M, Havana, Cuba
DWYER, William S.—M, Bridgeport, Conn.

EDKINS, Albert E.—M, Toronto, Ont., Can.
EDWARDS, Joseph B.—M, Bayonne, N. J.
ELLINSKY, Leonid I.—M, New York, N. Y.
ERICKSON, John Perry—J, Salt Lake City, Utah

FEE, Harold R.—J, New York, N. Y.
FILSKOV, Alfred—J, New York, N. Y.
FISH, J. A.—M, Perth Amboy, N. J.
FLETCHER, Herbert L.—M, Boston, Mass.
FREEMAN, Arthur C.—AM, Providence, R. I.
FREEMAN, Arthur E.—M, Wellesley Hills, Mass.

GAUM, Albert F.—J, Milwaukee, Wis.
GODDEN, Harry McC.—M, Boston, Mass.
GORDON, Constantine S.—AM, New York, N. Y.
GOSSMAN, Angelo L.—J, San Francisco, Cal.
GOUDY, Carl F.—J, Brooklyn, N. Y.
GOVE, Lewis P.—AM, New York, N, Y.
GUEMPEL, Robert R.—J, Bloomfield, N. J.

HARDING, Philip C.—M, Rancaqua, Chile, S. A.
HARNED, George T.—J, Chrome, N. J.
HARRIS, Benjamin E.—J, New York, N. Y.
HARTWELL, Floyd S.—M, Toledo, Ohio
HASSLER, John M.—J, Detroit, Mich.
HEINEN, Fred C.—J, New York, N. Y.
HEMPEL, John T.—J, St. Louis, Mo.
HILBERT, Charles D.—AM, New York, N. Y.
HOLLAND, F. W.—AM, New Bremen, Ohio
HOLMES, W. C.—AM, New York, N. Y.
HOLSWORTH, Robert C.—J, Casper, Wyo.
HORNER, Edwin F.—AM, L. I. City, N. Y.
HOWELL, Roger S.—AM, Atlanta, Ga.

JACKSON, Millard I.—J, New York, N. Y.
JACOBSON, Hugo Wm.—AM, Irvington, N. J.
JOHNSON, Clyde W.—AM, E. Cambridge, Mass.
JOHNSON, Gustave T.—AM, Indianapolis, Ind.
JOHNSON, Helge R. N.—J, Minneapolis, Minn.
JONES, Richard E.—M, Brooklyn, N. Y.

KEMENTT, Cornell—AM, Akron, Ohio
KENGLE, Lansford F.—J, Tacoma, Wash.
KEY, Elmer A.—J, East St. Louis, Ill.
KING, Everett F.—AM, Boston, Mass.
KJELDGARRD, Niels C. S.—M, South Bend, Ind.
KLEIN, Henry G.—AM, Bayonne, N. J.
KRAUS, Rudolf—M, New Kensington, Pa.
KRAUTHEIM, Wm. Chas.—J, Granite City, Ill.

LAIRD, George A.—M, New York, N. Y.
LEDDELL, W. A.—M, Denver, Colo.
LEE, Yuan—J, Philadelphia, Pa.
LICHTENBERG, Enrich H.—M, Milwaukee, Wis.
LIEBICH, Frank A.—J, Harvey, Ill.
LOTT, Samuel H.—M, Hoboken, N. J.
LOWE, John—A, New York, N. Y.
LYNDE, Jos. H S.—A, Bridgeport, Conn.

McCANN, Leland R.—J, Newark, N. J.
McCLURE, Samuel S.—J, Newark, N. J.
McDONALD, Frederick—M, Albany, N. Y.
McDOUGALL, G. F.—M, Portland, Ore.
McGOWAN, Frank R.—J, Washington, D. C.
MACK, Edwin Henry—J, Phillipsburg, N. J.
MALEEV, Valdimir I.—M, Los Angeles, Cal.
MANDELL, Irving F.—AM, Boston, Mass.
MANGUN, Leslie G.—AM, El Segundo, Cal.
MARCILLE, Gilbert G.—AM, Chicago, Ill.
MEADER, R. F.—J, Whitsville, Mass.
MEISENHELTER, Lewis R.—AM, Cincinnati, Ohio
METTEN, Irving H.—M, New York, N. Y.
MEYER, Charles W.—AM, St. Louis, Mo.
MOSHER, Clarence H.—AM, Newburgh, N. Y.
MURPHY, R. W. P.—J, Bayonne, N. J.
MURPHY, Wm. D.—J, Kearny, N. J.
MURRAY, J. Vincent—AM, Chicago, Ill.

NACKE, Arnold L.—AM, New York, N. Y.
NELSON, J. A.—M, Chicago, Ill.

O'BRIEN, Isaac K.—AM, Wilmington, Del.
OSGOOD, William R.—J, Cambridge, Mass.
OWEN, William O.—AM, Washington, D. C.

PAINE, Walter T.—J, Hamilton, Ohio
PARKER, Wm. P.—M, Philadelphia, Pa.
PESTA, Martin H.—M, Milwaukee, Wis.
PHILLIPS, B. T.—M, Shanghai, China
PIETSCH, W. Vincent—J, New York, N. Y.
PRICE, Morton M.—M, Philadelphia, Pa.
PUGA, Guillermo B.—M, New York, N. Y.

QUARLES, Frank W.—AM, Baltimore, Md.

REGENSBURGER, R. W.—M, Chicago, Ill.
REISER, Irving W.—AM, Toledo, Ohio
RIBLET, William H.—AM, New York, N. Y.
RICKERT, Louis L.—AM, Boston, Mass.
RIDINGS, Walter A.—A, Syracuse, N. Y.
RINEHART, Evan—M, Philadelphia, Pa.
ROBERTS, H. H.—J, New York, N. Y.
ROBINSON, Isaac V.—M, London, Eng.
ROESER, Harry M.—AM, Washington, D. C.
ROGERS, A. Carle—M, Toledo, Ohio
ROGERS, John L.—AM, Washington, D. C.
ROVE, Louis C.—J, Milwaukee, Wis.
ROWELL, Ralph K.—AM, Stratford, Conn.
RUDY, Frank H.—A, Boston, Mass.
RUGGLES, C. L'H.—M, Washington, D. C.
RUST, Henry P.—M, Philadelphia, Pa.

SALMONSEN, Robert—J, New York, N. Y.
SAVAGE, Edwin S.—AM, Cleveland, Ohio
SAXE, Walter E.—AM, Los Angeles, Cal.
SCHLEICHER, Emil J.—M, Granite City, Ill.
SCHNEITTER, Lee—J, Dallas, Tex.
SCHOFIELD, F. C.—M, Lynchburg, Va.
SCHULZ, George H.—J, New York, N. Y.
SEACHRIST, M. B.—AM, Lancaster, Pa.
SELLER, Joseph T.—A, Greenfield, Mass.
SHAW, George V.—AM, New York, N. Y.
SHERRETT, Charles S.—AM, Ithaca, N. Y.
SLEATH, Arthur Rollin—AM, Philadelphia, Pa.
SLINGSBY, Ernest W.—AM, Deep River, Conn.
SLOAN, William Allan—AM, Philadelphia, Pa.
SMITH, Chetwood—M, Boston, Mass.
SMITH, H. Collier—M, St. Marys, Ohio
SMITH, Halfdan—AM, Ilion, N. Y.
SMITH, Leonard F.—AM, Springfield, Mass.
SMITH, Robert J.—J, New York, N. Y.
SPANGLER, John I.—J, York, Pa.
STACY, John A.—AM, Detroit, Mich.
STEINBACH, Edward S.—AM, Boston, Mass.
STERLING, George R.—M, New York, N. Y.
STEVENS, William H.—AM, Philadelphia, Pa.
STRATTON, Earle R.—J, Boston, Mass.
SULLIVAN, Carl E.—AM, Foxboro, Mass.
SWOBODA, Hans O.—M, Pittsburgh, Pa.

TATNALL, Francis G.—J, New York, N. Y.
TAYLOR, John O.—M, Chicago, Ill.
THERKELSEN, Eric—AM, Lincoln, Neb.
THOMASON, Louis S.—M, New York, N. Y.
THOMPSON, George N. V.—AM, Winnipeg, Man., Can.
THOMPSON, Ross E.—AM, Deming, N. Mex.
TICER, Wilmer L.—AM, Washington, D. C.
TILDEN, Sydney G.—J, Philadelphia, Pa.
TOWLE, Haward A.—J, Chicago, Ill.
TRAVIS, James I.—AM, Newark, N. J.

UDDEN, Svante M.—AM, Houston, Tex.

van DIJK, Jan Willem, Dr.—M, Amsterdam, Holland
VAN RIPER, Francis H.—AM, West Hoboken, N. J.
VEATCH, N. T., Jr.—M, Kansas City, Mo.
VELANDER, Verner R.—AM, Scottdale, Pa.
VOISINET, Walter E.—J, Buffalo, N. Y.

WALKER, Wm. L.—A, Worcester, Mass.
WARMBOLD, H. E.—AM, Boston, Mass.
WAY, Wm. C.—M, Ottawa, Ont., Can.
WEIR, Milton L.—M, Buffalo, N. Y.
WHEELER, Frank I., Jr.—AM, Newark, N. J.
WHITMORE, J. Dale—M, Toledo, Ohio
WHITTET, Alexander—M, Rosebank, S. I., N. Y.
WIDAU, W. Earl—J, Jeannette, Pa.
WILCOX, William—M, Boston, Mass.
WILLIAMSON, John L.—M, Rochester, N. Y.
WILSON, Charles G.—A, Boston, Mass.
WILSON, George S.—AM, Elizabeth, N. J.
WILSON, William H.—AM, Springfield, Ohio
WISNER, Isle R.—AM, Watertown, N. Y.
WOODHOUSE, Robert J.—A, Jersey City, N. J.
WRIGHT, Charles R.—AM, Parkersburg, W. Va.

YAU, Charles Y.—J, Harrison, N. J.
YOUNGLOVE, Charles M.—M, Philadelphia, Pa.

EMPLOYMENT SERVICE BULLETIN

Conducted by the Employment Service of The Federated American Engineering Societies, 29 West 39th St., New York

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers. Non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

INSTRUCTOR in mechanics to begin work not later than February 14th. Instructional work of Department of Mechanics includes following subjects: Materials and testing, statics and dynamics, and mechanics of materials. Particular subjects to be taken care of by instructor will depend somewhat upon qualifications. Some teaching experience is desirable but not absolutely necessary. Pay will depend upon qualifications. Satisfactory service will bring reappointment for next year with increased salary. Location Wisconsin. X-156.

PROFESSOR OF MECHANICAL ENGINEERING, graduate of engineering college or university with both teaching and industrial experience. Location Nova Scotia, Canada. X-498.

INSTRUCTOR for classes in theoretical mechanics and physics, possibly one in mathematics and in drawing. Application by letter. Location New York State. X-515.

GENERAL INSPECTOR for company manufacturing gold-filled watch cases in Middle West X-584.

MASTER MECHANIC for company manufacturing gold-filled watch cases. X-585.

INSTRUCTOR to serve in steam, gas and material-testing laboratories. Should be a man of some experience in good mechanical-engineering laboratory. Location North West. X-630.

AUTOMOBILE BODY DESIGNER. Only experienced men considered. Location New York City. X-645.

SALES ENGINEER with steam-heating experience, in boilers, steam specialties and steam pumps. Location Virginia. X-646.

PROFESSIONAL DRAFTSMEN graduates of reputable engineering institutions who have had not less than 5 years' work in drafting rooms of large manufacturing concerns; for university in South. X-647.

TECHNICAL GRADUATE who believes he could sell advertising. Prefer man who has been identified with the activities of a college, for example, in managing or assisting in the management of one of the teams or societies. Location New York City. X-652.

INSTRUCTOR in Department of Engineering Mechanics and Hydraulics. State experience and minimum salary considered. Location Middle West. X-656.

GRADUATE MECHANICAL ENGINEER over 28 years of age to give instruction on cams and gears. Drafting-room experience essential. Evening work, three nights a week. Permanent position, starts September 1921. Location New York. X-662.

SALES ENGINEERS in tool-reconditioning field, and in sale of new tools used in shipbuilding industries, on a purely commission basis. Desirable opening to men with some practical tool experience and technical education. Territory New England and South Atlantic States. X-663.

ENGINEER experienced in manufacturing methods, having had charge of plants from both mechanical and executive sides. One who is especially qualified from executive standpoint desired. Location Mass. X-666.

ENGINEER experienced in estimating, drafting and specification writing especially for farm building and residences, to teach these subjects in southern school. Practical experience in building construction essential. Location Va. X-667.

INSTRUCTOR in mechanical engineering to teach mechanical-laboratory practice and machine design. Should be graduate of mechanical-engineering course with one or two years' practical experience, preferably handling machinery, conducting efficiency and economy tests, etc. Applications should be accompanied by photograph and detailed information as to age, experience and training. Location North East. X-671.

SALES ENGINEERS. Should have brains and initiative to make success of this kind of work, backed up by an engineering education, preferably mechanical, and one or two years' actual experience, not so much in sales work as in engineering. Would be put through a course of training and prepared for field sales work as soon as possible. X-672.

SALES MANAGER who has proven experience in directing sales and stimulating business generally in wide territory for company manufacturing automatic stokers. Should have this experience. Location Missouri. X-747.

CHIEF DRAFTSMAN, thoroughly experienced with best possible record in design of boiler and steam plants. Location New York City. X-750.

ENGINEER experienced in equipment of modern candy factory. Must not only be able to bring present equipment up to date, but also to enlarge plant and install modern equipment. Only men with this experience will be considered. Location New York City. X-688.

INSTRUCTOR in mechanical engineering to teach automotive engineering and also to assist in mechanical engineering laboratory and possibly to teach an elementary course in heat engineering. For applicant with proper qualifications we should offer title of Assistant Professor. X-691.

SALESMAN. Some engine knowledge desirable, but not essential. For city sales organization of New York manufacturer. Good opportunity for permanent and highly paid connection. X-701.

ENGINEER to design steam-power, heating, ventilating and plumbing equipments for buildings. Excellent opportunities for advancement to man with fundamental ability, enterprise and interest in this sort of work. Location N. Y. City. X-732.

SALESMEN to sell Ready Cut Homes direct from manufacturer. Man traveling in New England, West and Middle Atlantic States. May be used as side line. Liberal commission. Write for appointment. Location Seattle, Wash. X-733.

SALES ENGINEER to sell combustion efficiency, device and service. Location Greater New York City. X-681.

MEN AVAILABLE

The large number of requests to insert notices under this heading makes it necessary hereafter to limit the number of words in each notice to 20 so that as many members as possible may be accommodated.

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter; unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

MECHANICAL ENGINEER and DRAFTSMAN; technical graduate; age 28; 5 years' experience power-plant design, installation; steel and reinforced concrete. Salary in terms of results produced. Now employed. Location immaterial, preferably Eastern States. SM-6574.

ENGINEERING EXECUTIVE, 16 years central-station, industrial power engineering, especially large modern turbine plant design. Desires charge power department. SM-6575.

EXECUTIVE, 20 years' experience manufacture clocks, watches and small electrical instruments. Practical mechanic. Now employed. Can furnish reference. SM-6576.

HIGH-GRADE EXECUTIVE, superintendent or chief inspector; versed in modern methods of manufacturing, production, costs etc. Practical mechanic, successful in handling help. Age 38, technical education. SM 6577.

SALES or INDUSTRIAL ENGINEER, 20 years' experience accounting, advertising, sales, industrial engineering. Wide knowledge of country; specialized 4 years in rubber industry, industrial engineer large concern. SM-6578.

INDUSTRIAL ENGINEER. Age 28; married; Cornell graduate; 4 years' production work including time studies and rate setting; location immaterial; available immediately. SM-6579.

SUPERINTENDENT or production engineer; 20 years' on machines and special tools requiring intensive and accurate results in design and manufacture. SM-6580.

ELECTRICAL ENGINEER, 7 years' experience transmission, distribution and steam-power plant design and construction. Health excellent. Salary $3600. SM-6581.

GRADUATE ENGINEER, 15 years on design and construction, including installation of oil refining, power plant, machine tool, and electrical equipment. Practical executive ability. SM-6582.

MECHANICAL DRAFTSMAN, 10 years' general experience. Will take position anywhere. SM-6583.

SALES ENGINEER. Age 33; real record of accomplishment in engineering and salesmanship, desires connection with manufacturer of machinery. Vicinity New York preferred. SM-6584.

MEMBER with extensive engineering and manufacturing experience, especially quantity production of small parts, desires position as manager. Location Eastern States; available immediately. SM-6585.

MECHANICAL ENGINEER and designer, 9 years' practical experience designing department. Desires position of responsibility. Vicinity Bridgeport, Conn. Highest references. SM-6586.

GRADUATE MECHANICAL ENGINEER, experience as salesman, sales-manager, and general manager of manufacturing and engineering concern making steam specialties. SM-6587.

MECHANICAL ENGINEER'S ASSISTANT, 7 years' experience designing and installing central-power stations for municipality and public utilities. Well recommended. SM-6588.

INDUSTRIAL EXECUTIVE, graduate mechanical engineer; experience as production manager, chief engineer and superintendent large corporations; wants position preferably with smaller corporation where interest could ultimately be secured. SM-6589.

GRADUATE MECHANICAL ENGINEER; Lehigh-University; age 23; single. Two years' experience field and drafting room, seeks opportunity with progressive firm. SM-6590.

MANAGER. Metal industries, 20 years' manufacturing experience, 1000 men or more. Can develop and organization to meet competition. SM-6591.

EXECUTIVE, Harvard graduate, 1910; 6 years with leading public-utility management association; 5 years in charge of paper mill; now employed; desires executive position. SM-6592.

EXECUTIVE, 9 years' experience in manufacturing, production and cost systems, management. M.I.T. '12. Age 32; employed. New England preferred. SM-6593.

MECHANICAL and STRUCTURAL ENGINEER, technical graduate, practical mechanic; 18 years' experience plant layouts, construction, maintenance and machinery installation. Immediately available for master mechanic, plant or mechanical engineer. SM-6594.

TECHNICAL GRADUATE, mechanical engineering, desires position with reliable concern manufacturing machinery. Inventive turn of mind. Location New York City. SM-6595.

ASSISTANT PROFESSOR of mechanical engineering. Age 28. Four years teaching; practical shop experience. Now employed. Prefer steam laboratory and thermodynamics. SM-6596.

MECHANICAL ENGINEER, technical graduate with practical shop experience; mechanic, blacksmith, brass caster on electrical furnaces. Age 25; location or work immaterial. SM-6597.

MECHANICAL ENGINEER, 20 years' practical technical experience. Instructor (college), designer, production engineer, assistant manager. Typewriters, time recorders, guns, etc. Desires position designing engineer, assistant manager. SM-6598.

MECHANICAL ENGINEER, graduate Cornell; 5 years' experience sales, sales engineering, executive work in pressed-metal industry. Location not important. Ability could be applied to other lines. Married. Will travel. SM-6599.

MECHANICAL ENGINEER specializing invention, research and machine design. Can design machines from conception of fundamental ideas to finished details. Technical training and varied experience. SM-6600.

INDUSTRIAL ENGINEER, desires responsible position in management of manufacturing plant; Formerly member of H. L. Gantt's staff installing production methods. Age 33. SM-6601.

MECHANICAL ENGINEER, graduate; age 32; 10 years' successful experience in locomotive construction as foreman, inspector, draftsman, designer. Desires live position in any line offering opportunity for advancement. SM-6602.

SALES ENGINEER, age 27, mechanical engineer; 7 years' selling and designing experience; heating, ventilation, power plant and refrigeration, etc. Desires to connect with progressive firm of engineering equipment. SM-6603.

AUTOMOTIVE EXPERIMENTAL ENGINEER, available for investigational work on automotive equipment. Carburetion a specialty, possesses extensive knowledge of the fuel problem. SM-6604.

OIL-FUEL SPECIALIST. Age 31; graduate M.I.T. and U.S.N. Steam School. Marine license; 8 years' steam-equipment handling; valuation. Author of technical papers. Eastern preference. SM-6605.

DRAFTSMAN, age 31; M.E. degree. Seven years' experience on marine and station power plants. SM-6606.

PRODUCTION SUPERINTENDENT, technical graduate; age 31; 9 years' experience production, efficiency, rate setting, employment and industrial relations; references furnished. SM-6607.

MECHANICAL ENGINEER, M.I.T. graduate; age 28; 6 years' experience general plant engineering and experimental work. Desires production or management work. SM-6608.

NEUMATIC ENGINEER, design, installation, sales, of centrifugal fans, cyclone collectors, dust collecting, pneumatic conveying, ventilating, drying and humidifying systems. Technical graduate; now employed. SM-6609.

ENGINEER EXECUTIVE, wide experience in design, construction and operation of chemical plants; age 40; technical graduate; service in Orient preferred. SM-6610.

MECHANICAL ENGINEER, technical graduate; 11 years' varied experience, desires permanent location as designer, chief draftsman, assistant engineer or professor mechanical engineering. SM-6611.

DESIGNING ENGINEER, age 46; Cornell graduate and otherwise highly trained technically, experienced designer of steam engines and turbines, desires position as designing engineer. SM-6612.

MECHANICAL STRUCTURAL ENGINEER. Age 31; 11 years' broad experience chief engineer, chief draftsman and designer. Rolling mills, tube mills, special machinery, furnaces, cars, etc. Salary about $3600. SM-6613.

ENGINEER, designer; age 31; 13 years' experience wide field of industrial and mechanical-engineering design. Executive, sales or board position desired, where initiative is required; good executive; best references. SM-6614.

GRADUATE MECHANICAL ENGINEER, now president and sales manager of company, seeks larger opportunities for sales development work. Best references. SM-6615.

MECHANICAL SUPERINTENDENT, designer and development engineer; 19 years' broad manufacturing experience on interchangeable tools, automatic and general machinist. Technical graduate with up-to-date shop practice. N. Y. C. preferred. SM-6616.

MECHANICAL ENGINEER, M.E. Cornell; age 29; 5 years' combustion and power engineer oil and coal-fired plant; assistant works engineer; traveling power engineer; executive. Excellent references; employed. SM-6617.

MECHANICAL ENGINEER, A-1 experience power-plant economy mill construction and maintenance. Desirous of opportunity to design labor-saving devices; inventive ability, location optional; salary commensurate. SM-6618.

ENGINEER; age 33; married; 18 years designer, machine-shop foreman, chief draftsman, efficiency engineer; designing special machinery, tools, jigs, etc. Desires position where initiative and inventive ability is considered. SM-6619.

CHIEF ENGINEER, design and development; 10 years with builders of high-grade special and automatic machinery. Technical graduate; master mechanic; 25 years' experience production methods. Unusual creative ability; powerful executive. Available at once. SM-6620.

DESIGNING ENGINEER, 18 years' experience, bridge shop, steel-mill maintenance, machinery, bridge and structural steel, by-product, coke-oven apparatus, steam-power plants, etc. Reasonable salary. SM-6621.

ENGINEER, mechanical, assistant, age 30; technical graduate; 11 years' experience machinery and machine tools. Position desired, assistant to works manager. New York City. SM-6622.

EXECUTIVE. Administration or factory management; 16 years' experience, accounting, selling, purchasing, engineering, manufacturing, metal and wood working, tank, structural, automotive. SM-6623.

FACTORY MANAGER or machine-shop superintendent. Age 39, 20 years' practical experience. Organizer, expert on intricate machinery, tools, dies, etc., labor-saving and automatic equipment. SM-6624.

THERMAL INSTALLATING ENGINEER. Has specialized extensively on insulation against heat, cold, sound and condensation. Formerly traveling representative and manager, Boston office insulation manufacturers. SM-6625.

MECHANICAL and POWER ENGINEER; age 29; single; technical graduate. 7 years' experience, chemical, machine shop, sugar engineering, industrial, power-plant, operation, layout, design, calculation and investigation. Executive and business ability. SM-6626.

GRADUATE MECHANICAL ENGINEER, 11 years experience engineering, manufacturing, scientific management; executive; capable responsible work manufacturing, construction and designing. Reasonable salary, progressive organization presenting opportunities. SM-6627.

MAINTENANCE ENGINEER, age 31, desires new connection, 11 years' experience including 3 teaching and 3 consulting and maintenance for large rubber concern. SM-6628.

EXECUTIVE, technical graduate; age 29. Four years as assistant to manager malleable foundry, desires more promising position. SM-6629.

RESEARCH ENGINEER, graduate E.E., experienced research and development electrical appliances; familiar with patents and patent law. About to be registered patent attorney. Can handle small laboratory or assist in management large concern SM-6630.

PRODUCTION SUPERINTENDENT technical graduate; age 31; 9 years' experience in production, efficiency, rate setting, employment, safety, industrial-relations activities, references. SM-6631.

MECHANICAL ENGINEER; age 29; single, desires permanent connection steel mill under master mechanic. About 2 years' experience, in design of steel-mill machinery. Good mechanic, good worker and honest. SM-6632.

RAILWAY, MECHANICAL ADVISER, Spanish-speaking country. American fluent in Spanish and French; 9 years' mechanical experience; technical graduate. Desires position railroad work U. S. or South America. SM-6633.

EXECUTIVE MECHANICAL ENGINEER, technical graduate; 8 years' experience in charge design, construction, operation and maintenance of industrial and chemical plants. Age 33; single. SM-6634.

MARINE DRAFTSMAN or erecting engineer; American; age 32; 12 years' experience ship work, tanks, steel work, refrigerating plants, etc; 5 years in tropics, can handle all kinds help. Location immaterial. Desires permanent, responsible position on road. Salary $3000. SM-6635.

POWER and CONSTRUCTION EXECUTIVE, technical graduate; age 34; 13 years' experience power-plant construction, operation, management. Recently finished large construction job. Available immediately. SM-6636.

EXECUTIVE and industrial engineer or sales engineer or sales engineer for Puget Sound territory, to manage branch factory or sales. Excellent training and experience. SM-6637.

ASSISTANT ENGINEER; age 27; single; graduate M.E. 4 years' experience power analysis, mechanical equipment, testing design and layout complete power plants. Connection with designing or consulting engineer or power department large industrial organization. Pennsylvania or Ohio preferred. SM-6638.

MECHANICAL ENGINEER, superintendent large factory. Experienced in technical and executive branches. Designer of automatic machinery manufacturing steel balls and bearings. SM-6639.

GENERAL SUPERINTENDENT and SUPERVISING ENGINEER, technically trained in addition being practical mechanic; 20 years' varied experience. Exceptional ability for getting best results from men, material and equipment; develop progressive methods, processes and labor-saving devices for quality, quantity and low cost in growing concern or work out new enterprises. SM-6640.

CHIEF INSPECTOR, engineer, age 29, automobiles glass machinery, small arms, magnetos, adding machines, gages and fixtures. In Connecticut or New England. SM-6641.

M. E. Age 32, good personality, 11 years' practical experience covers buying, selling, design, construction and office management. Power-plant expert. SM-6642.

EXPORT MANAGER, graduate engineer, 17 years' experience exporting and importing steel products and machinery. Eight years lived in Far East SM-6643

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER AUGUST 29, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically

Unless objection is made to any of the candidates by Aug. 29, 1921 and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

DAVISON, WILLIAM W., Standard Oil Co., El Segundo
DELANY, JAMES H., Works Manager, Bean Spray Pump Co., San Jose
McKAY, NEIL H., Resident Engineer, Hercules Powder Co., San Diego
MILES, GEORGE W., Superintendent, Holly Sugar Corpn., Huntington Beach

Connecticut

BARTHOLOMEW, JAMES H., Connecticut Telephone & Electric Co., Meriden
HOLCOMB, HOWARD L., Tool and Machine Designer, Scoville Manufacturing Co., Waterbury
HUESTIS, THOMAS B., Mechanical Engineer, Terry Steam Turbine Co., Hartford
PADDOCK, CHARLES B., Chief Inspector, Hartford Steam Boiler Inspection & Insurance Co., Hartford
POLKOSNIK, B. LEONARD, Estimating in Planning Department, Scoville Manufacturing Co., Waterbury
ROWE, GEORGE E., Engineering Assistant, Hartford Fairmont Co., Hartford
WICKS, CLIFFORD P., Production Engineer, Metropolitan Body Co., Bridgeport

District of Columbia

CONWAY, JOHN S., Deputy Commissioner of Lighthouses, United States Department of Commerce, Washington
PEIFFER, DAVID C., Washington
WATSON, ROBERT C., Attorney with Watson, Coit, Morse & Grindle, Washington
WESCHLER, MAURICE E., Technical Assistant, The Catholic University of America, Washington

Florida

DUNTEN, ROSCOE I., Efficiency Engineer, Southern Utilities Co., Palatka
ROGERS, WILLIAM E., Manager, The Municipal Plant, Leesburg

Georgia

KEANY, THOMAS W., Secretary to City Manager & Draftsman, City of Brunswick, Brunswick
RUSSELL, ROBERT L., Atlanta

Illinois

BELLER, JOHN E., Major Ordance Department, Rock Island Arsenal, Rock Island
BERGER, ALBERT E., Production Engineer, Universal Stamping & Manufacturing Co., Chicago
DAVIS, JOHN F., President, J. F. Davis & Sons Co., Chicago
EICHELMAN, WILLIAM H., Engineer, Hamler Boiler & Tank Co., Chicago
FURR, RISTA J., Inspector London Accident & Guarantee Corpn., Chicago
HANSSEN, STAN L., Hanson Brothers, Chicago
HARTER, PAUL W., Alton Box Board & Paper Co., Alton
LAWNIN, NELSON, N. O. Nelson Manufacturing Co., Edwardsville
ORR, FRED, Assistant to Vice-President, Illinois Maintenance Co., Chicago

Massachusetts

FLETCHER, F. RICHMOND, Partner, Scovell, Wellington & Co., Boston
KNOWLTON, HARRY W., President, Knowlton & Newton Co., Inc., Lowell
PECK, ARTHUR D., Beverly
PLAYDON, J., JR., Engineering Assistant to Manager, Deane Works, Worthington Pump and Machinery Corpn., Holyoke
RUSSELL, EDGAR S., Campello
SCHMIDT, OTTO, Machine Designer, Gillette Safety Razor Co., South Boston
WINCHESTER, MARSHALL H., Manchester
ZORZOS, JOHN N., Student, Massachusetts Institute of Technology, Cambridge

Michigan

COVE, WILLIAM H., Counsel for the Furniture Industry, Grand Rapids

COYLE, FRANK J., Plant Manager, The McRae & Roberts Co., Detroit
JONES ALBERT E., JR., Anderson Electric Car Co., Detroit

Missouri

LUTKEWITTE, LOUIS F., Superintendent, The National Ammonia Co., St. Louis
MCCORMICK, GEORGE W., Superintendent, Steam Division, Westinghouse Electric & Manufacturing Co., St. Louis
RAWLINGS, WILLIAM S., Partner, Rawlings Industrial Equipment Co., Kansas City
RAZEK, JOSEPH, Technical Assistant, Chas. S. Lewis Co., St. Louis

Nebraska

SMITH, HOWARD N., The Refinite Co., Omaha

New Jersey

BENJAMIN, ORRIN L., Hoboken
BROWN, HUGH S., Engineer, Standard Oil Co., Elizabeth
DRANGE, CARL E., Walter Scott & Co., Plainfield
FORCE, WILLIAM C., Chief Inspector, American Type Founders Co., Jersey City
GARMEY, C. RONALD, Assistant to Manager, Marine Department, Brunswick Refrigerator Co., New Brunswick
HORAK, CHARLES A., Production Superintendent, Hyatt Bearings Division, General Motors Corpn., Newark
HUSTON, ANDREW J., Combustion Engineer, Hyatt Bearings Division, General Motors Corpn., Harrison
MAJOR, NATHANIEL, JR., Motion Study Engineer, F. B. Gilbreth, Inc., Montclair
MEIER, JOSEPH B., Lackawanna Ice Co., Newark
PESCE, JOSEPH D., Babcock & Wilcox Co., Bayonne
SMITH, L. RAYMOND, William L. Dickinson High School, Jersey City
VELEZ, JOSEPH R., Bayonne

New York

BAUMANN, GEORGE W., New York
BEEBEE, CULVER, Mechanical Draftsman, West India Sugar Finance Corpn., New York
BROMFELD, LEWIS, Auto Motive and Machine Designer, Ward Baking Co., Bronx
CONGDON, WALTER, Student, Pratt Institute, Brooklyn
CULLIN, WILLIAM W., R. H. Macy & Co., New York
DRISCOLL, EDWARD F., Assistant Engineer, P. Pryibil Machine Co., New York
EDWARDS, WILLIAM H., American Telephone & Telegraph Co., New York
ELLNER, GEORGE G., Sales Engineer, Tarf Co., New York
FIELDING, WILLIAM A., Coldwell Lawn Mower Co., Newburgh
FROSTHOLM, CARL C., Co-partner, Frostholm Bros., Syracuse
GOLLERSTEPPER, ADOLPH, Pierce Accounting Machine Co., Inc., New York
GOTTLIEB, DAVID, State Department of Labor, New York
GOTTLIEB, EDWARD, Rateau Battu Smoot Co., New York
GRIMSHAW, WILLIAM F., Sales Engineer, Ingersoll-Rand Co., New York
GROSSMAN, E. EUGENE, A. A. C. Patents, Inc., New York
HORSTMAN, LAWRENCE, Student, Pratt Institute, Brooklyn
HOUSLEY, THOMAS P., Superintendent, Foster Pump Works, Brooklyn
KIDDE, WALTER, President, Walter Kidde & Co., Inc., New York
KNIGHT, ALBION W., Designing Engineer, Green Fuel Economizer Co., Beacon
KRAMER, ALEXANDER E., J. Edward Ogden Co., New York
LAREW, J. LEE, Mechanical Engineer, Green Fuel Economizer Co., Beacon
LEMOVITZ, BENJAMIN, Brooklyn
LINDHORST, H. WILLIAM, Designer, Semet-Solvay Co., Solvay, New York
LOCKWOOD, ROBERT W., Contracting Engineer, Meadons Blower & Pipe Works, Brooklyn
MCCUNE, CHARLES A., Sales Engineer Page Steel & Wire Co., New York
MCGONIGAL, JOHN F., Terminal Engineering Co., New York
MENCKE, CARL G., Brooklyn
MERRITT, HAROLD W., Engineer, The Duplex Engine Governor Co., Inc., Brooklyn
NORRIS, JAMES M., Long Island City
PANISH, EDWIN J., Chief Engineer, Tiphany Phonetic Corpn., New York
PENNELL, CLARENCE E., New York Telephone Co., New York
PEVNEY, PAUL D., Pevney & Co., New York
PRANIN, JOHN R., Designer, Semet-Solvay Co., Syracuse
RAVDIN, JACOB, Assistant Engineer, Incandescent Supply Co., New York
RENTON, STEPHEN H., Sales Engineer, Combustion Engineering Corpn., New York
ROBE, GEORGE A., The Superheater Co., New York
ROSEN, NAHUM J., The Wilson Welder & Metals Co., Brooklyn
SCHOEN, LOUIS, Columbia Metal Box Co., Bronx
SHINN, FRANK G., Manager, Industrial Engineering, Universal Auditing Co., New York
SILBERT, S. JOSEPH, Consulting Engineer, Engineering Development & Finance Co., New York
SKELTON, CHARLES H., President, Skelton Tool Co., Syracuse
SORTORE, EMERSON J., Assistant to Engineer of Automatics, Western Union Telegraph Co., New York
TREE, EDWARD W., Associate Editor, Management Engineering, New York
TRESOUTHICK, STANLEY G., E. C. Woolfolk & Co., Inc., New York
WALTERS, JEROME J., Charge of Drafting Room, Pierce & Stogmark, Inc., New York
WATERS, HENRY H., Safety Engineer, Ocean Accident & Guarantee Corpn., New York
WAUGH, THOMAS, JR., Chief Draftsman, Empire Machine Co., New York
WEISS, NATHAN, Karl Vesterdahl & Co., New York
WHITE, WALLACE, Patent Attorney, William Wallace White, New York
WHYTOCK, JOHN, Robert Head, New York
WINOGRAD, ROMAN, New York

North Carolina

OLSEN, WILLIAM C., Consulting Engineer, Kinston

Ohio

BENNETT, ARTHUR F., Chief Draftsman, The Acme Machine Tool Co., Cincinnati
COOK, ALBERT C., General Sales Manager, The Warner & Swasey Co., Cleveland
ELY, HARRY A., Student, Ohio Northern University, Ada
LICKERT, WILLIAM J., Combustion Engineer, Champion Coated Paper Co., Hamilton
MARSHALL, HARRY C., Engineer, Hope Engineering & Supply Co., Mt. Vernon
TELLMAN, JOSEPH L., JR., Mechanical Engineer, Maumee Malleable Castings Co., Toledo

Oklahoma

BUCHANAN, THEODORE S., Chief Technologist, Maryland Oil Co., Ponca City
SHACKELFORD, JAMES F., Assistant Superintendent, Gasoline Plants, Standard Oil Co., Drumright

Oregon

MIKLE, CLINTON O., Chief Draftsman, Mechanical Department, Oregon, Washington Railroad & Navigation Co., Portland

Pennsylvania

AQUADRO, LINCOLN V., Engineer, Research Department, West Pennsylvania Railways Co., Pittsburgh
CECIL, ROBERT E., Vice-President and Manager, Air Tight Steel Tank Co., Pittsburgh
DALTON, WALTER, Consulting Engineer, Philadelphia
GALLAGHER, THOMAS G., Assistant Engineer of Construction, United Gas Improvement Co., Philadelphia
GROSS, EDWARD D., York
HOFFMAN, PHILIP J., Blast Furnace Engineer, Cambria Steel Co., Johnstown
KENNEY, FRANK M., Assistant Test Engineer, Duquesne Light Co., Pittsburgh
SCHMIDT, RUDOLPH, Sales Engineer, Elliott Co., Jeanette
SCHWEIKLE, ALBERT W., Assistant Plant Engineer, Franklin Sugar Refining Co., Philadelphia
SHEPPARD, JOSEPH R., Consulting Engineer, Philadelphia
SPENCER, HERBERT L., Designing Engineer, Carnegie Steel Co., Duquesne
STEVENSON, WILBUR W., Efficiency Engineer, Duquesne Light Co., Pittsburgh
WOLF, HOWARD A., Philadelphia

Tennessee

CLINE, EARL E., Mechanical Engineer & Superintendent, Ernest Holmes Co., Chattanooga

Texas

ORR, CAROL L., Efficiency Engineer, Texas Gulf Sulphur Co., Gulf

Utah

OTT, ORAN W., Consulting Mechanical Engineer, Salt Lake City

Wisconsin

CHAN, DIAM S. K., The Vilter Manufacturing Co., Milwaukee
DAVIS, RUSSELL G., Student, Chain Belt Co., Milwaukee
DONLEY, BARTRUM G., Chief Draftsman, Four Wheel Drive Auto Co., Clintonville
FRANKLIN, ROGER H., Johns-Manville, Inc., Milwaukee
KNUDSTAD, AMOS L., Mechanical Appraiser, American Appraisal Co., Milwaukee

Wyoming

FINNEY, WALLACE R., Superintendent of Gas Plants, The Midwest Refining Co., Casper

Ceylon

VENKATARAM, VISVANOTTIA, Assistant Electrical Engineer, Walker Sons & Co., Ltd., Colombo

Cuba

DORIA, LUIS DE PORRATA, Chief Mechanical Engineer, Melchoir Armstrong & Dessau, Inc., Havana

England

SINELNIKOFF, MICHEL P., Marshall & Sons, Gainsborough

Mexico

WILSON, EDWARD M., Technical Consultor, Industrial Department, Mexico Government, Mexico City

Sweden

EMERSON, CHARLES M., Consulting Engineer, Aktiebolaget Bofors, Bofors

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Illinois

HUNT, WILSON P., President and Manager, Moline Tool Co., Moline
ROSBOROUGH, CALDWELL R., Secretary and Sales Manager, Williams, White & Co., Moline

PROMOTION FROM ASSOCIATE MEMBER

Maryland

CYPHERS, JAMES F., Research Engineer, United States Industrial Alcohol Co., Baltimore

Ohio

DANIEL, ALLAN P., Consulting and Designing Mechanical Engineer, Bauer Bros. Co., Springfield
PAQUE, EDWARD J., General Works Engineer, The Pollak Steel Co., Cincinnati
SCHUTTLER, CARL H., Toledo

PROMOTION FROM JUNIOR

Colorado

SAWYER, WILFRED D., Assistant Engineer, Baker Steam Motor Car Co., Pueblo

Illinois

PENNEY, CHARLES F., Engineer, The Gardner Governor Co., Quincy (Reinstatement)

Kentucky

MCGLONE, ROY G., General Manager, Argonne Oil Co., Inc., Bowling Green

Massachusetts

LYTLE, CHARLES W., Director of Industrial Cooperation, Harvard University, Cambridge

New Jersey

BEVIN, SYDNEY, Research Engineer, Tide Water Oil Co., Bayonne

New York

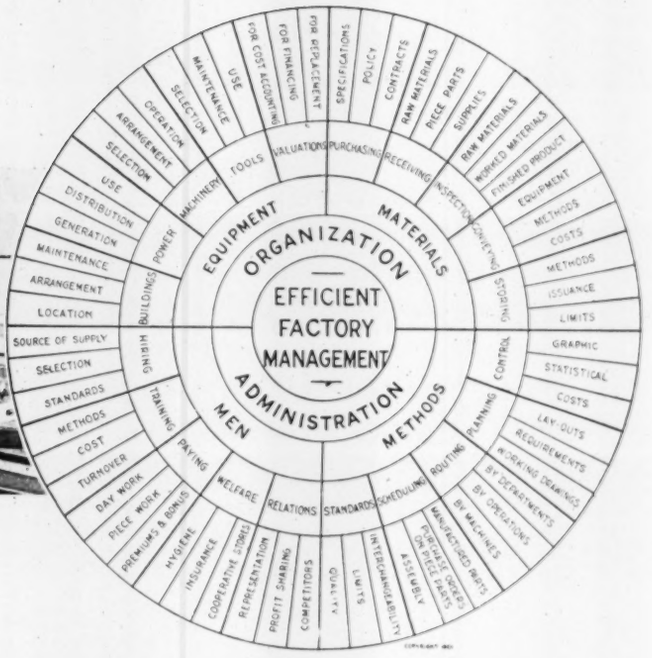
BURN, WALTER P., Assistant Sales Promotion & Advertising Manager, Tide Water Oil Co., New York

Ohio

LEEPER, RALPH W., Power Engineer, Management Engineering & Development Co., Dayton

SUMMARY

New Applications	144
CHANGE OF GRADING	
Promotion from Associate	2
Promotion from Associate-Member	4
Promotion from Junior	7
Total	157



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Mech. Engrg. August 1921

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Engineering Library

In Two Sections—Section Two

MECHANICAL ENGINEERING

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Vol. 43, No. 9 — A.S.M.E. AFFAIRS — September, 1921

GRAPHIC CHARTS SHOW DIVERSITY OF OUR ACTIVITIES

Participation of the Society in Standardization Work Featured This Month

Although the organization of any Society such as ours is so complex that an understanding of its several functions is greatly facilitated by means of graphic charts it can be readily perceived that there are as many ways of making such charts as there are angles of viewing the functions of the organization.

This month we present a chart which shows in particular the standardization work of the Society. It therefore emphasizes, in a way, the connection between the Society and specifications being used in the engineering industry. An analysis of the standardization organization within the Society reveals at once our connection with the American Engineering Standards' Committee. The function of our Society acting with this organization is to recommend standards within the field of our branch of engineering, and the A.E.S.C., in return,

(Continued on page 103)

PROPOSED LOCAL COUNCILS IN MICHIGAN AND CONNECTICUT

Increasing Interest Through Joining Activities of Several Societies

The several engineering groups in Detroit have recently sent representatives to a meeting called for the purpose of discussing the formation of a Detroit Engineering Council.

Similar action was taken by the engineering groups in Connecticut on the occasion of the second annual outing of the Connecticut Section of the A.S.M.E., reported on page 102. At that meeting about sixteen organizations were represented, and it was decided to proceed with the drafting of a plan of cooperation.

Some of the reasons for creating such an organization are to be found in the following list:

a Advantages in notifying members of all societies of meetings and papers to be held by other societies

b Avoidance of simultaneous meetings when these would divide interest

c Avoidance of duplication of subjects of meetings in the same locality

d Joint action in public affairs—legislative and other similar joint standing committees to act in matters of city, state and national importance

e Joint engineering meetings, at least one a year, with papers by eminent men

(Continued on page 103)

MATERIALS HANDLING DIVISION PLANS FOR ITS FUTURE WORK

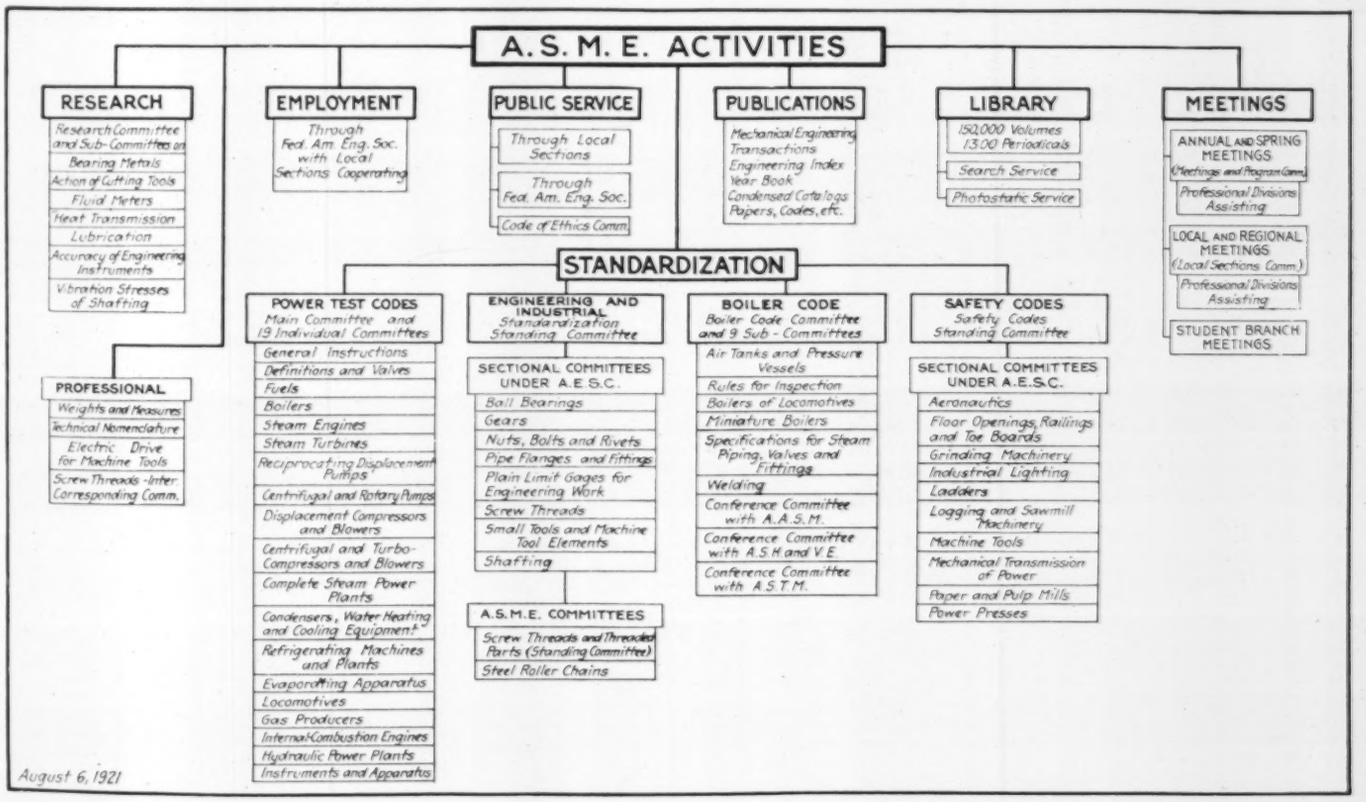
Administrative and Technical Committees Present Reports As to Scope and Methods

The Executive Committee of the Materials Handling Division met on Friday, July 15, for the consideration of the reports presented by the various organizing committees. The work of the Division has been placed in the hands of six committees; Membership, Industries, Equipment, Aims and Organization, Meetings and Papers, and Research.

The personnel of the committees appointed to date is as follows:

Membership Committee:
M. F. LAWRENCE, *Chairman*
Industries:
W. N. DICKINSON, *Chairman*
GEO. W. CRAVENS
Equipment:
R. H. McLAIN, *Chairman*

(Continued on page 102)



FORTHCOMING 1921 COUNCIL MEETINGS

It was originally planned that when the Council resumed its meetings, the October meeting should be held in Cleveland, the November meeting in Kansas City, and the December meeting in New York in connection with the Annual Meeting of the Society. However, since the cost of meetings when held away from New York is greater than when held at the Society's headquarters, and since it is essential that all expenditures be restricted as much as possible, it has tentatively been decided to dispense with the November Council meeting. The October meeting will be held in New York at the Society's headquarters.

A further reason for holding the October meeting in New York is that the four engineering societies represented on the delegation of American engineers which visited Great Britain and France this summer, are contemplating a joint subscription dinner of welcome to members of the delegation, thus providing an occasion on which their report may be received. If plans materialize the boards of direction of the societies, officers of associated societies, and representatives of foreign societies and of foreign governments will participate in this event. Holding the Council meeting at this time will make it possible for our officers to be present in equal numbers with those of the other societies.

SECRETARY'S LETTER

Public Interest in the Object of an Engineering Society

When one goes on his vacation, making new friends, it is but natural that as acquaintanceship develops the new friends should be interested to learn one's occupation and seek subjects of common interest.

The secretary has found a sincere desire to learn just what is the object of a professional society.

In addition to the obvious, the Secretary has tried to tell more regarding the background, the motivation, of a Society, and has been rewarded by finding that invariably people respond approvingly to the statement of the higher ideals of the engineering profession. Standardization? Yes. Preparation of codes, technical papers, conventions, etc.? Yes. But for a far greater purpose than the needs of the immediate present—for the idea of advancing civilization.

This has a bearing on the question of registration of engineers, particularly in those states where there is a difference of opinion even among engineers as to what is a professional engineer.

Fortunately for a century we have had a noble definition of engineering—one recently made still more inspiring by the late Mr. Henry G. Stott, whose concept, now inscribed on the walls of the Engineering Societies Library, should be kept constantly in mind by every engineer.

> "Engineering—The art of organizing and directing men, and of controlling the forces and materials of nature for the benefit of the human race."

Likewise Mr. Swasey in his deed of gift of the original grants to the Engineering Foundation put the same spirit in his beautiful language.

> ". . . for the furtherance of research in science and engineering, or for the advancement in any other manner of the profession of engineering and the good of mankind."

In the Secretary's reading this summer he has found also a definite trend toward idealism in the world at large, and this serves as an encouragement to make the engineering society of one's profession the medium through which its members may express themselves and do their share of the world's work.

CALVIN W. RICE,
Secretary.

ABERDEEN MEETING ON OCTOBER SEVENTH

Special Demonstration of Ordnance Matériel

An unusual opportunity will be afforded the members of the Society to witness the demonstration of the very latest developments in ordnance materiel at Aberdeen Proving Grounds, located at Aberdeen, Md., which is about midway between Wilmington and Baltimore. This demonstration will require the whole day of Friday, October 7, and admission to the Proving Grounds will be restricted to A.S.M.E. members and members of the Army Ordnance Association and the Society of Automotive Engineers, all of whom were especially invited by Colonel C. L'H. Ruggles.

Since extending the invitation, Colonel Ruggles has been assigned to the War College and a board of officers of the Ordnance Department has been appointed to take charge of the program. Col. J. W. Joyes, Chief, Technical Staff, Ordnance Department, U. S. A., as chairman of this board, will have charge of the arrangements.

The program will begin about 9.30 a.m. and will in general consist of the following:

a Firing of small arms, including tracer bullets from machine guns
b Firing of mobile guns
c Firing of major-caliber guns from 12-in. to 16-in.
d Demonstration of tanks, tractors and trailers
e Demonstration of bomb dropping from balloons and aeroplanes.

In the evening there will be a brief technical session under the auspices of the Army Ordnance Association which will feature some talks by officers and officials of the Association.

Arrangements will be made for the departure of visitors by convenient transportation to trains leaving Aberdeen for the North and South between 8.00 and 9.00 p.m., allowing for arrival at Philadelphia and Baltimore at reasonable hours in the evening.

A luncheon and dinner will have to be provided under a contract arrangement with a caterer specifying the number of meals to be served and allowing for very small variation. It is therefore requested that all who are interested in making this trip immediately advise the Secretary, in order that proper provisions may be made.

In accordance with the rules of the War Department, admission to the Proving Grounds will be limited to members of the organizations invited who are citizens of the United States and who are not manufacturers of munitions for foreign countries with which this country is at war.

Owing to lack of suitable facilities, it will not be possible to entertain ladies.

In view of the fact that daylight-saving time will no longer be effective and standard time will again be used in New York, and probably in other eastern cities, at the time this excursion is made, the regular morning train service to Aberdeen from Philadelphia and cities north is not good. From Washington and Baltimore, however, there is a fairly convenient train. This leaves Washington at 7.45 a.m., Baltimore at 8.35 a.m., and arrives at Aberdeen at 9.24 a.m. It is desirable that members advise the Secretary as promptly as possible of their expectations to make this trip, because if sufficient numbers come from any of several localities, it will be possible to have special sleeping cars attached to convenient trains and have these parked at Aberdeen, so that members may occasion no discomfort due to the necessity for getting early morning trains. Should the number of members attending from any locality prove to be inadequate to secure special cars, members are advised to plan to spend the night preceding the trip either at Baltimore or Wilmington.

Those members who had the privilege of visiting the Aberdeen Proving Grounds in December 1918 will long remember the wonderful treat

(*Continued on page 103*)

FIRST SECTION MEETING OF SEASON 1921-1922

The first report of a meeting to be held by any of the Local Sections comes from the Connecticut Section, which held its second annual summer outing at Double Beach on the Sound on Friday, July 15, 1921.

As one of the speakers remarked, the Committee dared St. Swithin and lost, and the result was a heavy downpour of rain, which, however, did not deter about 60 members from turning out.

The presidents and officers of other local engineering societies and clubs were the guests of the Section, and during the outing a convention was held at which it was determined to formulate some joint council or committee which would act as a clearing house for all matters of general interest. Mr. H. R. Westcott and Prof. E. H. Lockwood, both A.S.M.E. members, were chosen chairman and secretary, respectively, of a committee to develop this coöperative organization.

During the afternoon games were substituted for the sports which had been scheduled for out of doors. These games took place in a large hall and a number of useful prizes were distributed to the winners. There were events for both ladies and gentlemen.

A special feature of the outing was the presentation of a gold watch to Prof. E. H. Lockwood in recognition of the service rendered the Connecticut Section during the ten years he has acted as secretary of the New Haven Branch.

The Committee in charge of the arrangements consisted of Messrs. A. C. Jewett, H. E. Adt, K. F. Lees, P. W. Ripple, H. L. Seward, and H. R. Westcott.

FUTURE WORK OF MATERIALS HANDLING DIVISION

(*Continued from page 101*)

J. A. SHEPARD
C. H. NEWMAN
G. TITCOMB
Aims and Organization:
H. V. BOZELL, *Chairman*
H. V. COES
Meetings and Papers:
ROY V. WRIGHT, *Chairman.*

The Aims and Organization Committee will function continually, perfecting and improving the organization, defining its scope and making recommendations to the Executive Committee to enable the various committees to work more advantageously and in closer harmony. In its report, considered at this meeting, the Aims and Organization Committee suggested that in all the work of the Division emphasis be placed upon the economic aspect of materials handling. The various technical committees, such as Equipment, Industries, and Research, are given two duties: First to correlate information and progress, making reports annually; and second, to encourage individual investigation which will result in papers for the meetings.

W. N. Dickinson, chairman of the Committee on Industries, presented a report in which he outlined coöperation between the committees on Industries and Equipment. It is planned that the Committee on Equipment shall be made up of men engaged in the manufacture of materials-handling equipment and the Committee on Industries of men in the consulting or operating field. The Committee on Industries is engaged in studying the various industries which made a pronounced advance in the handling of materials to the extent that application of machinery has been standardized in a number of different plants. Symposiums on these industries are suggested so that development of standard methods can be adopted for other industries.

GRAPHIC CHART OF A.S.M.E. ACTIVITIES

(*Continued from page 101*)

in accepting a recommendation to standardize, designates our Society as the sponsor and our Council appoints a committee to function as the sectional committee of the A.E.S.C. The standards created are passed upon by our Council and referred to the A.E.S.C., which adopts them if they are satisfactory, and they are then given out to the industry.

The Boiler Code and Power Test Codes work is retained within our own Society. The progress of the boiler code work is reported from month to month in Part I of MECHANICAL ENGINEERING. The Power Test Codes are under complete revision, and the new individual codes are now being issued. It is expected that the finished work will be published within another two years.

REGIONAL MEETING CANCELLED

The Cleveland Section has decided to cancel altogether the regional meeting scheduled for October 3 and 4. Originally this meeting was to have been held in June, but was postponed at that time because of the wish to avoid any possible conflict with the Spring Meeting held at Chicago. Present conditions, however, make it undesirable to proceed with the plans of the meeting.

Committee Meetings

Committee on Organization of Society Activities, on July 28.

Materials Handling Division, executive committee, on July 15.

Management Division, executive committee, on Aug. 15.

Membership Committee, meetings held weekly.

Meetings and Program Committee, administrative committee, August 15.

ENGINEERING SOCIETIES LOSE VALUED EMPLOYEE

Members of the Society who attended the last two Annual Meetings in New York will undoubtedly recall the excellence of the arrangements provided in the Engineering Societies Building for handling the large body of guests. These arrangements and the faultless maintenance and operation of the building throughout the year were due to Christian O. Osterberg, building superintendent, who was killed in an automobile accident early in August while conducting a party of boys on a vacation trip.

The Engineering Societies making their homes in the Building have suffered a severe loss by Mr. Osterberg's death. His work, the painstaking, consistent sort that does not get into spread heads, was an exceedingly important factor in the conduct of the various organizations in the building.

DESIGN OF PIN ADOPTED FOR STUDENT BRANCHES

The accompanying illustration shows the design for the pin which has been officially adopted for members of all Student Branches of the Society. The design shows the regular A.S.M.E. blue enamel badge superimposed on a clover leaf of larger dimensions.

The space outside the A.S.M.E. badge permits of the use of the individual colors of each college and also permits the initials of the University to be inserted at the bottom portion of the pin. The word "Student" appears at the top.

The pin shown is one which has been gotten up for the students of Cornell University. Arrangements will be made whereby all members of Student Branches of the Society will here-

STUDENT BRANCH PIN
(Double Size)

after wear a pin of the design in question instead of the pin which has been issued heretofore, i.e., a shield upon which was superimposed the regular blue badge.

The new pin will be the size of the small badge now used by the Society, and students entitled to wear it will be able to secure a pin through the secretary of their Student Branch.

Members of the Society are asked to extend special courtesies to any student member of the Society who may identify himself by wearing the badge. He will be provided also with a card of identification, signed by Secretary Calvin W. Rice and countersigned by the secretary of his particular Student Branch.

Recent Section Meetings

Connecticut State:
New Haven Branch. July 15. Outing of the entire Connecticut Section, under the auspices of the New Haven Branch, at Double Beach, Conn.

Houston. June 3. Two papers on Solid-Injection Engines, by H. L. Thompson, and Mr. Palmer, representative of De la Vergne Co.

Ontario. July 22. Mid-Summer Excursion meeting, to visit the Queenston-Chippewa Development Works of the Hydro-Electric Power Commission of Ontario, Niagara Falls, Ont.

San Francisco. July 28. Informal talk on the program for future meetings.

The name of Paul A Porter as correspondent to MECHANICAL ENGINEERING for the Worcester Local Section of the Society should have been included in the list published on page 89 of Section Two of the August issue.

PROPOSED LOCAL COUNCILS IN MICHIGAN AND CONNECTICUT

(*Continued from page 101*)

f Holding at least one joint formal dinner a year, with speakers of eminence

g Providing a liaison between societies, thus substituting organized, unified, coöperative action for haphazard, disconnected and unsystematic action.

A suggested means for bettering conditions would be an advisory committee composed of two persons from each society, each elected alternate years. This committee would effect its own organization and elect a chairman, secretary and such other officers and sub-committees as were advisable. It would meet at stated intervals, perhaps monthly, and act on such matters as seem expedient. Expenses would be borne by all societies interested.

Each participating society would retain in every detail its original and particular identity. The committee would act only in an advisory capacity, except in special cases where definite authority was given by the societies interested.

Advantages of Joint Organization

There would be many advantages in such a plan. Some of these would be:

a Increased attendance at meetings and more direct support of the societies

b More active participation by members in meetings, securing an intelligent discussion of papers and a wider circulation of valuable knowledge and experience

c Provision of a wider circle of friends among the members and a more general participation in the good-fellowship

d Encouragement and help to officers, and a greater opportunity for men to serve on committees, without duplication

e Every one a worker; every one a booster; no stagnation.

The correct method for progressing in such movements is to invite a meeting of delegates, discuss the proposition, and ask each delegate to report back to his particular society and obtain its support if possible. Those societies which approve will select representatives and proceed with the organization of the joint committee.

Follow the example of Connecticut. Study their action and method as disclosed in the following resolution and take the same initiative. Success will follow.

> *Resolved:* That such a committee of the engineering societies in Connecticut is desirable for the purpose of increasing interest in and the usefulness of said societies, and be it further resolved that those present endorse and pledge themselves to endeavor to secure the active support of their respective societies with the intention of completing the organization on or before January 1, 1922.

ABERDEEN MEETING

(*Continued from page 102*)

which was given by the Ordnance Department at that time, and many of them will doubtless wish to again make the trip in order to see the progress which has been made during the past three years. Members who did not have the opportunity to visit the Proving Grounds on the previous occasion should certainly take advantage of the present trip. Further details will be furnished on request.

Coming Section Meetings

Mid-Continent. (*Tulsa, Okla.*) Weekly luncheons at Tea Cup Inn, Tulsa, Okla., Friday noon.

San Francisco. Weekly luncheons at the Engineers' Club, every Thursday noon.

Metropolitan. (*New York City*) September 23. Subject: Snow-Removal Problem. To be held in Engineering Societies Building, N. Y. C.

Personals

Lee M. Elliott is now construction foreman for the Havana Electric Railway, Light & Power Co., Havana, Cuba.

R. A. Wurgel, fire protection engineer and inspector for the Oil Insurance Association operating in the Mid-Continental oil fields, has resigned and returned to the East.

Elbert C. Fisher has taken a position as plant engineer at the Picatinny Arsenal, Dover, N. J.

Hubert S. Wynkoop has been appointed by President Berresford of the American Institute of Electrical Engineers to represent the Institute in coöperating with the Building Codes Committee of the Department of Commerce.

Dwight T. Farnham, formerly consulting industrial engineer of St. Louis, is now vice-president of C. E. Knoeppel & Co., Inc., New York, N. Y.

Eugene A. Leinroth is now with the Albro-Clem Elevator Company, Cleveland, Ohio. He was formerly with the Chicago Pneumatic Tool Company, Philadelphia, Pa.

Leo E. Rush, who is associated with the American Road Machinery Company, Inc., is now located at Groton, N. Y.

Edward L. Dillon, until recently located in the St. Louis office of Fairbanks, Morse & Co., is now in the Dallas, Tex., office of that company.

Harry W. Anderson, formerly with the Templar Motors Corporation, Lakewood, Ohio, is now general sales manager for the Duesenberg Automobile & Motors Co., Inc., Indianapolis, Ind.

Harry A. Stenken has resigned from The American Sugar Refining Co., and is now located with The W. J. McCahan Sugar Refining and Molasses Co., Philadelphia, Pa.

A. L. Jones, Jr., has been transferred from the Deane Works of the Worthington Pump and Machinery Corporation at Holyoke, Mass., to its Kansas City office.

W. F. Caldwell, recently designing engineer for Meigs, Bassett & Slaughter, chemical engineers for the Tubize Artificial Silk Company's plant at Hopewell, Va., is now field engineer for the Gulf Refining Company, at Port Arthur, Tex.

E. W. Burbank, district manager for the Allis-Chalmers Manufacturing Company, is now located at Dallas, Texas, having transferred from New Orleans, La.

C. G. Tolley has accepted a position as engineer with John T. Rowland, Jr., architect, of Jersey City, N. J. He was formerly with Arthur D. Little Company, Cambridge, Mass.

Chester C. Jackman, formerly factory manager for the Victor Saw Works, Springfield, Mass., has become vice-president and treasurer of the Dolman Manufacturing Company, Inc., Springfield.

James O. G. Gibbons, previously with Westinghouse Church Kerr & Co., together with C. E. Brown, who for the past few years has been a U. S. Ordnance engineer, have opened an office in Newark, N. J. to practice consulting engineering, specializing in power plants and industrial problems.

Winfred H. Van Gorder has severed his connection as factory manager for The Automatic Ticket Selling & Cash Register Co., Inc., New York City, and for the present is located in Vestal, N. Y.

F. R. Ginorio, for eleven years connected with the sugar industry, working with The Cuban-American Sugar Company, has opened offices as consulting engineer, specializing in all branches of sugar-house work. He is located in Havana, Cuba.

Nixon W. Elmer has opened an office in Quincy, Mass., as consulting engineer in conveying and mechanical handling. He was formerly engineer for the Harry M. Hope Engineering Company, Boston, Mass.

J. M. Meany is now president of the Ball Engineering Company, Portland, Ore. He was formerly western manager for the Clyde Iron Works of Duluth, Minn.

H. R. Sago, until recently with the Grinnell Company of Atlanta, Ga., is now fire service inspector, Atlanta Water Works, City of Atlanta.

Charles V. McIntire has resigned his position as chief engineer of the International Coal Products Corporation to enter the field of consulting engineering in New York, specializing in by-product coke-oven work, low-temperature distillation of coal processes and other systems pertaining to the preparation and treatment of coals.

Edgar MacNaughton, formerly assistant professor of mechanical engineering at Tufts College, Mass., has been made professor.

Philip W. Swain is now associate editor of *Power*. He was previously with The Franklin Mfg. Co., Franklin, Pa.

Carroll F. Merriam has been appointed instructor at Worcester Polytechnic Institute.

L. W. Helmreich, formerly with the Arkansas Corporation Commission, Little Rock, Ark., is now chief mechanical and electrical engineer for the Missouri Public Service Commission, Jefferson City, Mo.

I. N. Zavarine, until recently metallographist for the Winchester Repeating Arms Company, New Haven, Conn., has been appointed assistant in the mechanical engineering department of the Massachusetts Institute of Technology, Cambridge, Mass.

L. C. Huff is now with the Universal Oil Products Company, Roxana Petroleum Corporation, Wood River, Ill. He was previously associated with the Milwaukee Electric Ry. & Light Co.

Paulsen Spence is no longer connected with Crane Company but has accepted the position of sales engineer for A. W. Cash Company, valve specialists, of Decatur, Ill. His headquarters are in Detroit, Mich.

W. L. Conrad, who for many years was manager of the office of the late H. L. Gantt, assisting in the introduction of modern methods of management in industrial plants throughout this country, has opened an office in New York for consulting practice in management. He will follow along the lines advocated by Mr. Gantt and the work contemplated will include the introduction of modern methods of management, production and costs.

A. M. Morrell, formerly purchasing agent for Nordyke & Marmon Co. of Indianapolis, Ind., is now sales engineer, Edward R. Ladew Company, inc., and is located in San Francisco, Cal.

Parker M. Robinson has been transferred from the Marine Engineering Department to the Power Sales Department of the Westinghouse Electric & Mfg. Co. and has been sent to the Pacific Coast as a specialist in steam-power apparatus. He is located in Los Angeles, Cal.

Carl D. Smith has severed his connection with the Hazel Atlas Glass Company of Washington, Pa., to become associated with the Simplex Engineering Company of the same city.

John M. Smith, formerly designer for the Hooven, Owens, Rentschler Company, is now in the engineering department of The Gardner Governor Company, Quincy, Ill.

A. H. Hudson is now located in Buffalo, N. Y. with Dann Products, Inc. He was previously manager of purchases for The Isko Company, Chicago, Ill.

W. A. Leddell is no longer with the Mine & Smelter Co. of Denver, but has become associated with the Hardinge Company of the same city.

Julius L. Hecht, who has been in the employ of the Public Service Company of Northern Illinois since 1905, was recently elected to the position of assistant to the vice-president. He will take over the duties of general superintendent.

An agreement was recently effected between the firms of A. & D. R. Black, Washington, D. C., and Alexander Klemin and Associates, New York, N. Y., by which the former has taken over the offices vacated by latter firm upon the removal of its staff to the plant of the Cox-Klemin Aircraft Corporation, College Point, N. Y. Inquiries which Mr. Klemin is no longer in a position to handle will be referred to A. & D. R. Black. Messrs. Klemin, and Archibald and R. Black are all members of the Society.

W. G. Jones has recently been elected vice-president and treasurer of the W. A. Jones Foundry & Machine Co. of Chicago. He will continue to serve as general manager.

Paul P. Austin, Jr., has left the employ of the Freeport Sulphur Company at Freeport, Tex., to take a position as training officer with the Federal Board for Vocational Education, Division of Rehabilitation, in San Francisco, Cal.

Harry M. Pillars, formerly chief engineer for The Koster Company of San Francisco, is now a member of the firm of Leo Kaufmann Company, San Francisco.

Stuart F. Brown, formerly production engineer with the Whitin Machine Works of Whitinsville, Mass., builders of textile machinery, is now manager of the Whitinsville Spinning Ring Co., makers of specialties.

Hugo Diemer has been appointed director of the new Industrial Management Division of LaSalle Extension University. This division will comprise industrial management efficiency, modern foremanship and production methods, and personnel management.

Adolph F. Soben, until recently assistant chief engineer for The American Machine & Mfg. Co., Atlanta, Ga., has opened offices in Los Angeles as consulting engineer and designer of special and automatic machinery.

George A. Laird, general manager of the Guiana Development Co., has resigned and expects to return to the United States after completing some examinations for that company along the Brazilian frontier.

V. A. Zehr, consulting engineer of Pekin, Ill., sailed August 4 for Europe to investigate construction work near Prague, Bohemia.

William H. Severns has been appointed assistant professor of mechanical engineering at the University of Illinois. He was previously connected with the Extension Division of the University of Wisconsin.

C. Whitney Crosby has resigned as production engineer for the Automatic Signal Co., St. Paul, Minn., and has become associated with the Chas. L. Pillsbury Co., consulting engineers of Minneapolis, Minn.

Carl T. Mack has severed connections with Henry L. Doherty & Co., New York, to enter the employ of the patent law firm of Prentiss, Stone and Boyden of Washington, D. C.

Boyd Fisher, previously with The Tabor Manufacturing Co., Philadelphia, is now with Lockwood, Greene & Co., Boston, Mass.

L. A. Vandervoort announces his resignation as general superintendent of the Chestnut and Smith Corporation, Texas Division, to engage in consulting engineering in Ranger, Tex., specializing in the manufacture of gasoline from petroleum gas. The firm is known as Vandervoort, Crutchfield & Terrell.

Welton A. Snow has left the employ of the Goodyear Tire & Rubber Co. of Akron, Ohio, to enter the contracting and engineering business in Miami, Fla., with O. A. Sandquist, under the firm name of Sandquist & Snow, Inc. Mr. Snow is secretary and treasurer of the firm and also chief engineer.

J. F. McNutt has finished his work for the U. S. Indian Service and has accepted a position as chief engineer for The Leaver Manufacturing Company, Oakland, Cal.

James Carnegie, Jr., is now engineer of power plants for the Kwang Tung Electric Supply Co., Ltd., Canton, China.

H. E. Hallock, formerly with the Bridgeport Printing Plate Co., is now a member of the firm of Marmon Fairfield Company, Bridgeport, Conn.

George E. Barett, formerly manager in the marine department of Lenher Engineering Company, New York City, is now works manager for S. Flory Manufacturing Co., Bangor, Pa.

The pulverized coal installation for The Milwaukee Electric Light & Railway Co., Milwaukee, Wis., of which O. L. McIntyre was in charge, has been finished, and he has now been put in charge

of the Chicago office of the Fuller Lehigh and Fuller Engineering Company.

HERMAN B. BRIGGS, of the Kaiser Paving Company, has been transferred from Seattle, Wash., to Cottonwood, Cal.

H. W. THOMPSON, Denver, Colo., has been appointed sales representative in that territory for the M. H. Detrick Co. of Chicago.

EDWARD R. BLINN, formerly superintendent of maintenance and construction for the Solvay Process Company, Syracuse, N. Y., has been appointed engineer of the Syracuse plant.

NORMAN B. ROPER has recently resigned as general manager of the Sociedad Minera Backus y Johnston del Peru, of Casapalca, Peru, and has returned to Los Angeles, Cal.

H. O. FULSON is now located in Atlanta, Ga., as division engineer for The American Cotton Oil Company.

JAMES A. BRAKES, JR., announces that he has resigned his position as head of the department of mechanical engineering at Ohio Northern University, Ada, Ohio, and is now structural engineer for the Chateaugay Ore & Iron Co., Lyon Mountain, N. Y.

R. E. LEIGH is now manager for Charles B. Van Valen, Inc., real estate and building management, New York City. He was formerly cost engineer for the J. G. White Engineering Corporation.

ELLWOOD ROWAND, JR., is now connected with the Northern Indiana Gas and Electric Company, Hammond, Ind.

ARTHUR B. MARSH, formerly with the Hamel Shoe Machinery Company, Bridgeport, Conn., is now with Wright, Brown, Quinby & May of Boston, Mass.

PHILIP S. VAN WYCK has resigned from the Chicago Great Western Railroad and is now with the Mesabi Iron Company, Babbitt, Minn.

W. C. BRUMBLE, formerly resident mechanical engineer, Muncie Products Division, General Motors Corporation, is now equipment engineer for Durant Motors, Inc., Long Island City, N. Y.

M. C. GILLETT has been transferred from manager of the Philadelphia branch office to plant manager of the Standard Heater Company, at Williamsport, Pa.

GRAHAM L. MONTGOMERY has recently organized the firm of Montgomery & Fishkind, consulting engineers, New York, which will handle consulting work of a mechanical and structural nature. He has also become a partner in the firm of Vreeland, Fishkind & Co., industrial engineers and architects, New York.

L. L. SMITH, formerly Minneapolis branch manager of the Under-Feed Stoker Company of America, is now associated with Morgan Gerrish Company, Minneapolis, Minn. Mr. Smith will continue to represent through the Morgan Gerrish Company, the Under-Feed Stoker Company of America, as well as several other manufacturers of allied lines of power plant equipment.

GEORGE H. KRUEGER, formerly with the Anderson Draft Regulator Company, is now mechanical engineer in Seattle, Wash.

PETER EHLERS has resigned his position as chief engineer for the McCahan Sugar Refining Company of Philadelphia, Pa.

CHARLES U. CARPENTER is no longer connected with The Trailmobile Company, of Cincinnati, Ohio.

Necrology[1]

WILLIAM ROBERT PARK, consulting engineer for the Hancock Inspirator Company, Boston Mass., died in Taunton, Mass., on July 28. Mr. Park was born in Brooklyn, Conn., in August, 1831. After serving three years as an apprentice in a machine shop he was employed successively by the Taunton Locomotive Mfg. Co. and the Mason Machine Works. In 1858 he went to Boston to the Grover & Baker Sewing Machine Co., with which he remained until 1876, when the firm was dissolved. From then up to the time of his death Mr. Park was connected with the Hancock Inspirator Company, serving as superintendent and manager and finally as consulting engineer. He also founded the firm of W. R. Park & Son, plumbers and steamfitters of Taunton. Mr. Park's inventions were so numerous and valuable that he was awarded a gold medal by the United States Government for his achievements in mechanics. Mr. Park was a life-member of the Society, which he joined in 1889.

WILLIAM W. LIGHTHIPE, engineer for the Otis Elevator Company and well-known as an elevator expert, died August 7 in the Long Island Hospital. Mr. Lighthipe was born in 1875 in Vincentown, N. J He was graduated from Columbia University in 1898 with the degree of electrical engineer. He was employed successively by the Metropolitan Electric Construction Co. and the Sprague Elevator Co. until 1901, when he became assistant superintendent of the Otis Elevator Company. With the exception of two years when he served as superintendent of construction and engineer for the Marine Engine & Machine Co., he was connected with this firm up to the time of his death. Mr. Lighthipe became a member of the Society in 1907.

JOHN MULLEN, president of the National Bank of Shamokin, Pa., and former head of John Mullen & Son, iron workers, foundrymen and machinists, died February 22, 1921, after a brief illness. Mr. Mullen was born Feb. 27, 1838, at Port Carbon, Pa. At the age of ten he began an apprenticeship as a machinist with T. H. Wintersteam at Port Carbon, with whom he remained for 15 years. He then became a member of the firm of Robert Allison & Co., which shortly afterward lost its entire plant by fire. When the shops were rebuilt Mr. Mullen was appointed foreman and remained with the firm in that capacity until 1870 when he removed to Shamokin and became a member of the firm of Mullen & Huffman, who leased and conducted the Shamokin Iron Works. The firm was later known as Mullen & Bittenbender, John Mullen & Co., and finally as John Mullen & Son, and the Mullen Foundry was considered one of the most modern of its time. In addition to the iron industry Mr. Mullen was actively interested in electrical inventions, soft-coal industry, powder industry, steam heating, and other manufacturing and public-service concerns. He became a member of the Society in 1886.

EDWARD ALBERT SUVERKROP, for fifteen years a member of the editorial staff of the *American Machinist*, died on July 29, 1921. Mr. Suverkrop was born in Washington, D. C., May 6, 1864, and was educated in Crieff, Scotland, and in Fettes College, Edinburgh, Scotland. He learned his trade as a marine engineer in English and Scotch shops and his work took him to all parts of the world. In 1894 he started a machine shop in Camden, N. J., moving to Philadelphia and opening a larger shop in 1897. In 1904 he became associated with the *American Machinist*, with which he remained until 1919, when he resigned to develop his method of manufacturing accurate gage blocks. He had begun to place his product on the market at the time of his death. Mr. Suverkrop became a member of the Society in 1913.

ALONZO GARTLEY, vice-president and consulting engineer for C. Brewer & Co., Ltd., Honolulu, Hawaii, died in June 1921. Mr. Gartley was born in Cedar Falls, Iowa, October 1869. He was graduated from the United States Naval Academy in 1890 and began his engineering experience in the drafting room of Cramp's Shipyard and Pennsylvania Iron Works, Co., Philadelphia, Pa., where he remained for about one year. For the next eight years he was engaged in superintending the erection of various gas works, including the Philadelphia plant of The United Gas Improvement Company of Philadelphia. Since then he has been located in the Hawaiian Islands, as manager of the Hawaiian Electric Co., Ltd., managing central station, consulting and contracting for electric plants, and in the position held at the time of his death. Mr. Gartley became a member of the Society in 1911.

GEORGE NATHAN GIFFORD, assistant to the plant engineer, American Printing Company, Fall River, Mass., died on May 1, 1921. Mr. Gifford was born at Dartmouth, Mass., July 1887. He was graduated from Worcester Polytechnic Institute in 1910 with the degree of S.B. During his college vacations he was employed in the engineering office of the American Thread Company of Fall River. After graduation he became salesman of quarrying and mining machinery for the Sullivan Machinery Company, of Claremont, N. H. and remained with this firm until June 1911, when he became associated with the American Printing Company, with which he remained up to the time of his death. During this time, in addition to general mill engineering, he assisted in the installation of a modern boiler plant and in large power-plant developments. Mr. Gifford became a Junior Member of the Society in 1913 and was promoted to associate membership in 1918.

EDMUND MACKENZIE, for many years engaged in design and construction of power plants, pulp and paper mills, and industrial plants in this country and in Norway, died in March, 1919. Mr. Mackenzie was born in Kragers, Norway, in January 1877. He was graduated from the Skienstjordens Technical School in 1894. He then came to America and engaged in drafting room work successively with the Sprague Elevator Company, the Westinghouse, Church, Kerr & Co., and other firms. In 1909 he returned to Norway as supervising engineer of construction work with R. Blakstad, Karl Johansgade, Kristiania, Norway, the position he held at the time of his death. He became a member of the Society in 1909.

[1] For details of the professional careers of deceased members, see necrology section of the forthcoming issue of the Transactions of the Society.

New Members of the Society

The following is a list of those who have qualified for membership in the Society between the dates of July 1 and August 1. The grade is indicated by the symbol after the name; i.e., M-Member; A-Associate; AM-Associate-Member; J-Junior.

ALDEN, LEON V.—J, Middleboro, Mass.
AMARI, YOSHIMASA—J, New York, N. Y.
AMORY, FREMONT D. JR.—A, New York, N. Y
AMSTUTZ, J. B.—J, Chicago, Ill.
ANTHONY, LAMONT W.—M, Brooklyn, N. Y.
APPERSON, JOHN S.—J, Schenectady, N. Y.
ARMSTRONG, EDWIN J.—M, Philadelphia, Pa.
BALFE, JOHN P.—AM, Dawson, Can.
BARRITT, JOHN W.—M, Philadelphia, Pa.
BAUER, PETER W.—J, New Britain, Conn.
BEALS, EDWARD D.—M, Neenah, Wis.
BENFORD, DAVID M.—A, Mt. Vernon, N. Y.
BEV, GEORGE H. T.—AM, Jersey City, N. J.
BIEVER, EDMUND J.—AM, Oconto, Wis.
BINTZ, CARL—J, Saginaw, Mich.
BLACK, FRED E.—J, Berkeley, Cal.
BLAND, MILES C.—M, Harrisburg, Pa.
BREADY, IRA J.—J, Chicago, Ill.
BRIGHAM, FREDERICK W.—J, Hartford, Conn.
BURKE, JOSEPH T.—J, Cleveland, Ohio.
CARTER, WILBER H.—J, Pensacola, Fla.
CHAMBERLAIN, JAMES S.—J, Elizabeth, N. J.
CLARKE, HERBERT E.—AM, Bethlehem, Pa.
CLAUSEN, JENS—M, Harrisburg, Pa.
CLEAVENGER, WILLIAM P.—M, Indiana Harbor, Ind.
CORLEY, JOHN P.—AM, New York, N. Y.
DAVIS, VERNER F.—M, Newark, N. J.
DOUGLASS, ALFRED E.—AM, Fullerton, Pa.
DURBECK, ALBERT C.—J, Cohoes, N. Y.
DURBIN, PAUL C.—J, New York, N. Y.
DWYER, LEON W.—J, Watervliet, N. Y.
EARLE, NORMAN P.—J, Chicago, Ill.

DUNBAR, JOSEPH B.—AM, Yuma, Ariz.
ECKERT, HENRY R.—J, New York, N. Y.
ELMENDORF, ARMIN—AM, Chicago, Ill.
ENGLAND, ERNEST W.—AM, Detroit, Mich.
ERICKSON, WILLIAM N.—J, Chicago, Ill.
EVANS, ROBERT T.—M, Akron, Ohio.
FREDERICKS, C. C.—J, St. Louis, Mo.
GEPHART, HENRY O.—M, New Haven, Conn.
GERHARD, WILLIAM G.—J, Newburgh, N. Y.
GIFFIN, HARRY W.—M, Groton, Conn.
GILBERT, JOSEPH C.—J, Frankford, Philadelphia, Pa.
GOUGH, HARRY F.—AM, Cincinnati, Ohio.
GREENE, WHITNEY E.—J, Peacedale, R. I.
GREENHALGH, JOHN—AM, Leominster, Mass.
GUHA, K. K.—AM, Saharanpore, U. P., India.
GUMPPER, HAROLD D.—AM, Detroit, Mich.
HALL, LEO G.—AM, Onekama, Mich.
HALL, NORMAN M.—M, Winnipeg, Can.
HARMAN, GEORGE F.—J, Sellersville, Pa.
HARRISON, WILLIAM L.—M, Richmond, Va.
HARTER, LABAN W.—M, South Bend, Ind.
HATFIELD, HARVEY C.—AM, Boston, Mass.
HECKEROTH, WILLIAM C.—M, Erie, Pa.
HERLIHY, JOHN—AM, Boston, Mass.
HESS, WINTER D.—M, Providence, R. I.
HIRSHHEIMER, LOUIS C.—M, La Crosse, Wis.
HIRST, RUSSELL W.—J, Boston, Mass.
HIXON, CHARLES R.—M, Auburn, Ala.
HOFFMANN, AUGUST—M, Philadelphia, Pa.
HOLMES, WILL J.—M, Tulsa, Okla.
HOPKINS, RALPH Z.—AM, Detroit, Mich.
HOUSE, FRANK R.—J, Brooklyn, N. Y.
HRICOVSKY, GEORGE JR.—J, Chicago, Ill.
IRWIN, VINCENT H.—AM, Minneapolis, Minn.
JANSO, ERNEST J.—AM, South Bend, Ind.
JETTE, C. H.—AM, Cape Madeleine, Que., Can.
JIMESON, ROBERT M.—J, Charleroi, Pa.
JOHNSON CARL H.—J, Bridgeport, Conn.
JONES, EDWIN F.—J, St. Paul, Minn.
KARES, EDWARD H.—AM, New York, N. Y.
KERR, ARTHUR J.—J, Foxboro, Okla.
KIMBALL, NORMAN F.—M, Utica, N. Y.
KINDERVATER, JULIUS—M, New York, N. Y.
KULJIAN, HARRY A.—J, New Haven, Conn.
KUME, JINTA—AM, New York, N. Y.
LEWIS, ROBERT D.—J, St. Paul, Minn.
LINTON, WILLIAM D., JR.—AM, Durham, N. C.
LIPMAN, LEWIS—AM, Buffalo, N. Y.
LOEBLEIN, JOHN M.—AM, Cleveland, Ohio.
LONG, JOSEPH K.—J, Sunbury, Fla.
LOYSTER, CARL E.—M, Milwaukee, Wis.
LUDWIG, WALTER W.—J, Lima, Ohio.
McBURNEY, WM. A.—J, Roanoke, Va.
McCULLCOH, ALBERT P.—M, Boston, Mass.
McGOUGH, FRANK—AM, Weirton, W. Va.
MacCAMY, HARRY JAMES—AM, Spokane, Wash.
MAGGIN, M. DANIEL—J, New York, N. Y.
MAHAN, J. R.—J, Independence, Kan.
MARQUARDT, WM. H.—AM, Muskegon, Mich.
MEYNS, LAWRENCE J.—J, Stithton, Ky.
MILLS, BERNARD—M, New York, N. Y.
MITCHELL, EDWIN F.—J, Chicago Heights, Ill.
MOHLER, DAVID D.—M, Syracuse, N. Y.
MONTAGUE, JOSEPH F.—AM, Conshohocken, Pa.
MOONEY, PAUL P.—J, New York, N. Y.
MOORE, JOHN J.—AM, Chicago, Ill.
MORRIS, SYDNEY S.—J, Philadelphia, Pa.
NELSON, O. T.—M, Waukegan, Ill.
NEWHOUSE, W. F.—AM, Benton Harbor, Mich.
NICHOLS, ARTHUR D.—AM, Avenel, N. J.
NICHTA, JOHN J.—J, Cleveland, Ohio.
NIEDERHAUSER, F. E.[1]—AM, Roanoke, Va.
OLEWINE, GEORGE A.—AM, Fall River, Mass.
O'NEILL, HAYLETT—M, Chicago, Ill.
O'NEILL, JAMES L.—AM, Philadelphia, Pa.
PAULEY, JAMES B.—A, Chicago, Ill.
PEIRSON, M. B.—AM, Chicago, Ill.
PERKINS, MYLES S.—J, El Segundo, Cal.
PETERSON, HAROLD C.—J, Chicago, Ill.
PETRIE, ROBERT B.—M, New York, N. Y.
POOL, RALPH Y.—M, Bound Brook, N. J.
QUIGG, EDWARD A.—M, Jersey City, N. J.
RAITT, GEORGE H.—AM, Toronto, Can.
RAYMAKER, JAS. H.—M, Chicago, Ill.
REITZ, ROBERT A.—AM, Baltimore, Md.
RIDLON, JOHN R.—AM, New York, N. Y.
ROBERTSON, BURTON J.—M, Minneapolis, Minn.
ROOSEVELT, NICHOLAS G.—M, Philadelphia, Pa.
ROUNDY, CARYL H.—AM, New York, N. Y.
RUCKMAN, JOHN H.—AM, Philadelphia, Pa.
SCHUMACHER, EDWIN F.—J, New York, N. Y.
SCHUSTER, WM. A.—AM, Pittsburg, Kan.
SCHWENNESEN, H. A.—M, Westfield, N. J.
SCOTT, WILLIAM G.—AM, Montreal, Que., Can.
SEELY, LESLIE T.—J, Irvington, N. J.
SELDEN, G. D. JR.—AM, Erie, Pa.
SEXAUER, LLEWELLYN C.—AM, New York, N. Y.
SHUFF, EVANS L.—J, Chicago, Ill.
SINGER, ALEXANDER P.—M, Memphis, Tenn.
SLEEPER, HAROLD R.—J, New London, Conn.
SMITH, LYMAN M.—AM, E. Angus, Que., Can.
SOULE, GEORGE—J, Brooklyn, N. Y.
SPITZENBERG, H. M.—AM, Lynbrook, N. Y.
STANDISH, EDWARD K.—M, Boston, Mass.
STANDLEY, CARROLL M.—AM, Hazleton, Pa.
STECK, FRED—AM, Milwaukee, Wis.
STEIGER, HERMAN—J, Baltimore, Ohio.
STOKES, FREDERICK M.—AM, Boston, Mass.
TAYLOR, J. H.—AM, Shelton, Conn.
THOMAS, ROSEWELL W.—J, Okmulgee, Okla.
TOMILINSON, MALCOLM C. W.—M, Springfield, Ohio.
TOWER, C. LATHROP—M, Boston, Mass.
TURCOTT, DAVID—J, Beloit, Wis.
TURNER, C. A. P.—M, Minneapolis, Minn.
TYDEMAN, F. W. L., DR.—AM, Wood River, Ill.
WALKER, CHAUNCEY C.—AM, Worcester, Mass.
WALSH, DAVID J.—M, New York, N. Y.
WANICEK, JOHN J.—J, Annapolis, Md.
WARDMAN, LEONARD WM.—AM, Galt, Ont., Can.
WARSHAW, NATHANIEL—AM, Atlantic, Mass.
WEIMAN, LEWIS—AM, Newark, N. J.
WEST, J. W., JR.—J, Tulsa, Okla.
WILLEY, DEAN F.—J, New Haven, Conn.
WILLIAMS, FRANK E.—AM, Boston, Mass.
WHITON, GARDNER W.—M, Biddeford, Me.
WHYTE, ROBERT B.—M, Kenosha, Wis.
WOLD, ERNST P.—AM, Bridgeport, Conn.
WOOD, HERBERT B.—AM, Boston, Mass.
VEINOTE, THOMAS H.—AM, Cambridge, Mass.

[1] Elected to membership in January 1921. Omitted from previous list.

EMPLOYMENT SERVICE BULLETIN

Conducted by the Employment Service of The Federated American Engineering Societies, 29 West 39th St., New York

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

INSTRUCTOR, three or four years' mathematical training, to teach freshman mathematics, college algebra, trigonometry, and analytical geometry. Should have doctor's degree in mathematics from a recognized university. Salary depends upon qualifications and experience of man appointed. Send recent photograph and full statement of courses in mathematics studied and credentials regarding experience in teaching and ability in mathematics. Application by letter. Location Middle-West. X-752.

ASSISTANT IN MATHEMATICS. Subjects: freshman mathematics, college algebra, trigonometry, and analytical geometry. Should have three or four years' college mathematics and prefer men who have had some experience as instructors. Would appeal to young men who desire to take up graduate work in mathematics, and, at the same time, teach enough classes to pay expenses. Send recent photograph and full statement of courses in mathematics studied and credentials regarding experience in teaching and ability in mathematics. Application by letter. Location Middle West. X-753.

SALES ENGINEER to sell stock in connection with chain store project. Location New York City. X-758.

SALES ENGINEERS familiar with pump valves. Man with mechanical training or engineer with hydraulic or construction experience would qualify. Location New York City. X-762.

DRAFTSMAN and designer experienced in road machinery and concrete mixers. Must have initiative and be aggressive and capable of developing into a chief draftsman with executive ability. Location Wisconsin. X-764.

SALES ENGINEERS for tires and motor trucks to spend about 8 weeks in New York in training, after which may be made district manager in Chicago or Cincinnati, Cleveland, Kansas City or Minneapolis. X-767.

SALES REPRESENTATIVE for New York and vicinity for boiler-tube cleaner. Would be expected to make a stack to stack canvass, also report calls to office to permit of coöperation with him by means of follow up letters. Liberal commission and splendid field for the sale of the tool in New York and vicinity. X-769.

SALESMEN to sell hardware, mill supplies and tools on commission in Metropolitan district. Young men preferred. Location New York City. X-775.

ENGINEER with boiler room experience (operation or selling). Invest $3000–4000 toward opening up a branch office in Pittsburgh or Middle West and take charge of this branch. Salary will be paid. X-806.

CHIEF DRAFTSMAN who has had experience in designing pavers, mixers, graders, ditchers, or other heavy, portable machines which are manufactured in quantities. Must also have executive ability, energy and ideas. Location Wisconsin. X-813.

REFRIGERATING ENGINEER, to supervise operation of compression and absorption plants manufacturing ice. Must be graduate of one of leading technical schools and must have had at least five years' experience either in operation or design of ice plants, or both. Experience with burning of oil under boilers also desirable. Location Florida. X-814.

MECHANICAL ENGINEER to take charge of office. Will be called upon to do office work as well as work in field. Age between 30 and 40 years. Sugar mill machinery experience necessary. Must be good draftsman and familiar with boiler tests and indicator practice. Also must have experience in mill-roll work. Prefer single man. Must speak Spanish. Location Cuba. X-816.

ASSISTANT IN SALES OFFICE. Young man with experience as steel detailer, and estimates and also stenographic experience. Location New York City. X-822.

INSTRUCTORS in general engineering drawing and descriptiveg eometry. Location Mid-West. X-829.

YOUNG MAN of technical education and some engineering experience, and if possible a little editorial experience, to become associate editor of journal published every two weeks in interests of cement, lime, crushed stone, sand, gravel, phosphate, rock, slag, talc, and other mineral industries. Location Illinois. X-834.

ENGINEER with sufficient standing, financial ability, and certainty of his own ability to be able to work on commission alone. Sound judgment in financial and business matters more necessary than technical ability. Some selling experience necessary. Location New York City. X-843.

MECHANICAL DRAFTSMAN. Prefer men who have had experience on textile machinery. Location Rhode Island. X-856.

MAINTENANCE ENGINEER for textile-weaving plant including dyeing and finishing. Familiar with installation work and general up-keep, who could figure the cost of installation as well as check up on the general efficiency. Location Pennsylvania. X-861.

ENGINEER with scientific school education and several years responsible work in manufacture and distribution of illuminating gas wanted for foreign service by American corporation. Executive ability and knowledge of or aptitude for foreign languages important. Application by letter. State fully training, experience, languages, age, health, dependent family and salary expected or received. Location Foreign. X-863.

INSTRUCTOR to handle machine design, kinematics, empirical design and descriptive geometry. Would like to get man who would develop the work along the lines of inventive problem rather than excessive routine drawing. Location Pa. X-866.

MEN AVAILABLE

The large number of requests to insert notices under this heading makes it necessary hereafter to limit the number of words in each notice to 20 so that as many members as possible may be accommodated.

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter; unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

EFFICIENCY ENGINEER wishes to connect with growing firm offering opportunity for advancement. Now employed as industrial engineer; Age 30, technical graduate. SM-6644.

ALUMINUM SPECIALIST, graduate mechanical engineer, 10 years' experience, operation and design of rolling mills and cooking utensil plants. SM-6645.

MECHANICAL ENGINEER degree, Case School of Applied Science; age 28; married. Teaching experience in machine design and mechanical drawing; prefer Middle West. SM-6646.

MECHANICAL ENGINEER, graduate Purdue University; age 26; 7 months' steam plant operating experience, 2 years' in sales department of Westinghouse Electric and Manufacturing Company handling stoker equipments. Desire executive or engineering position with future. Available at once. SM-6647.

ASSISTANT PROFESSOR mechanical engineering wishes position in September. Age 32, graduate of Cornell University, M.E. and M.M.E. degrees, 12 years' experience in engineering research and teaching. SM-6648.

MEMBER wishes position in drafting room. Twenty years' experience steam and gas engines; tractors; power plants, hoists, transmission machinery SM-6649.

PETROLEUM ENGINEER, M.E., age 33. Broad experience in production and pipe line work; desires position with large oil company. SM-6650.

GRADUATE MECHANICAL ENGINEER with first assistant unlimited marine license, desires position in operating or superintendent engineer's office of steamship company. Age 25. Experience in steamship business and in design and construction of cargo and passenger vessels. Minimum salary $250 per month. SM-6651.

PRODUCTION SUPERINTENDENT of proved ability desires permanent position. Good reference. Location optional. Available September 1. SM-6552.

MECHANICAL ENGINEER, 20 years' experience, design, installation, maintenance of manufacturing and power-plant equipment. Immediately available. Eastern location. Salary $3600. SM-6553.

MECHANICAL ENGINEER; age 25; graduate of Stevens; 2 years' experience in maintenance and power plant work. Desire position assistant to works manager or master mechanic. SM-6554.

FOREIGN SERVICE, mechanical engineer, 8 years' experience in reorganization of plant equipment and manufacturing methods, desires similar opportunity in foreign service. Married. Available September. SM-6655.

INDUSTRIAL RELATIONS OR EMPLOYMENT manager. Age 32; 6 years' experience in formulating and directing personal relations policies. SM-6656.

MECHANICAL ENGINEER, graduate middle-western University. Present position, charge of production automobile forgings. Executive ability. Desires connection with progressive men. SM-6657.

MECHANICAL ENGINEER, desires position, factory manager or general superintendent. Experience in small accurate interchangeable parts, extremely heavy accurate work and gray iron and brass foundry. Have had charge of plants employing from 200 to 6,000 people. Up to date in latest method of production and manufacturing. Age 38. SM-6658.

WORKS MANAGER, age 48; married; American; 17 years' manufacturing experience, specialty small interchangeable parts. SM-6659.

MECHANICAL ENGINEER, technical graduate; age 26, desires position as assistant to works manager, or with heating and ventilating engineer. Four years' experience in power-plant piping, heating and ventilation for factories and schools, fire protection systems; 2 years' as maintenance engineer. Prefer vicinity of New York. $3100. SM-6660.

BUILDING EQUIPMENT SPECIALIST member, returning September; 18 months Far East, complete charge of mechanical work. Open for engagement with builder, contractor or architect. SM-6661.

WORKS OR PRODUCTION MANAGER, 19 years' experience on metal working industry, organization, production control, costs. SM-6662.

SALES ENGINEER, graduate M.E., desires agency high-grade mechanical specialties, portable and pneumatic tools, machine tools, etc. Commission. Established Philadelphia territory. SM-6663.

SALES REPRESENTATIVE. Machinery salesman well acquainted with New England and New York State. Minimum salary $3000. SM-6664.

MECHANICAL AND ELECTRICAL ENGINEER; age 28; 10 years' business engineering, estimating, executive experience, desires position as assistant executive, or business partnership with responsible party. SM-6665.

PLANT AND CONSTRUCTION ENGINEER technical graduate; age 33; 5 years' electrical power construction, 4 years' mechanical and general plant construction; 2 years' steam plant testing and operating. SM-6666.

ASSISTANT to industrial engineer or factory manager. Technical education; 7 years' manufacturing experience, drafting tools, finding costs and doing organization work. Married. Salary $175 per month. Available on 15 days' notice. SM-6667.

INDUSTRIAL ENGINEER, 15 years' executive experience. Industrial relations; production control. Acquainted Leitch and Lever plans; foreign languages. Location immaterial. SM-6668.

MECHANICAL ENGINEER; age 42; married. Experience: 17 years' teaching; two years dean and president; 18 months in America, designing and testing gas and Diesel engines. Specialty, thermodynamics, gas, steam and experimental engineering. SM-6669.

FACTORY SUPERINTENDENT OR WORKS MANAGER, metal stampings; deep drawing. American, age 37; 16 years' experience on metal products of varied lines, specializing in promotion of production and reduction of costs. Familiar modern manufacturing and shop management. Available one month's notice. SM-6670.

MECHANICAL ENGINEER, technical graduate; age 26. Experience in shop and drafting room, and in planning and estimating, also executive experience. Desire position as assistant to superintendent or works manager; location immaterial. SM-6671.

MECHANICAL ENGINEER, graduate; age 29; 7 years' experience in factory, office, drafting and marine engineering. Desires position with manufacturing concern. SM-6672.

DESIGNER. Ten years' experience, automatic, production machinery, tools, intricate machines. Technical graduate, age 32. Location Middle West. SM-6673.

PRODUCTION ENGINEER EXECUTIVE, Cornell M. E., age 35; 13 years' experience, production control, planning, scheduling, rate setting, tool design and manufacture. SM-6674.

INSTRUCTOR AND DESIGNER, technical graduate 4 years' experience design pumping and special machinery; 2 years' teaching drawing and design, desires position teaching or design. SM-6675.

SALES ENGINEER, mechanical engineer, age 27; Successful sales record on special mechanical equipment and experience on combustion of coals. Desires eastern connection. SM-6676.

MECHANICAL or production engineer; age 32; married; 17 years' experience from apprentice machinist to chief draftsman, desires permanent connection with future. SM-6677.

SALES ENGINEER, mechanical engineer, age 27, 7 years' selling and designing experience in heating, ventilation, power plant, refrigeration, etc. Desires connection with engineering equipment firm. SM-6678.

PRODUCTION ENGINEER; graduate civil engineer; age 29; married; 6 years' experience covering plant construction and maintenance. Now assistant works engineer of large steel and wire company. SM-6679.

MECHANICAL ENGINEER, wide executive, installation, construction experience various countries. Knowledge Spanish, German, French. Employed. SM-6680.

DESIGNER ENGINEER, age 31; 13 years' experience wide field of engineering design, industrial and mechanical. Executive, sales or board position desired. Location immaterial; references. SM-6681.

MECHANICAL ENGINEER, opening office in Milwaukee, desires to represent manufacturers of engineering commodities in Milwaukee or Wisconsin territory. SM-6682.

PROCESS AND EQUIPMENT ENGINEER, 16 years' experience as tool-room foreman, chief draftsman, factory superintendent, process and equipment engineer. SM-6683.

MECHANICAL ENGINEER, 5 years' experience in tropical sugar factory in charge of operation and maintenance. Broad general experience. SM-6684.

EXECUTIVE ENGINEER, industrial and commercial building design and construction; 18 years' experience. Assoc. Mem. Am.Soc.C.E. and Am. Soc.M.E., age 37; married; American; Christian. Salary $4800. SM-6685.

EXECUTIVE, 20 years' experience on manufacture of clocks, watches and small electrical instruments; practical mechanic; now employed. References. SM-6686.

TECHNICAL GRADUATE, age 25, desires position as assistant to mechanical engineer or superintendent; 4 years' practical experience draftsman and designer, production, maintenance. SM-6687.

MECHANICAL ENGINEER, technical graduate age 26, desires to locate with concern for development as executive or for industrial work. SM-6688.

ERECTING ENGINEER, M. E. graduate, age 29, 3½ years' steam turbines and condensers. Desire position drafting or test engineer. Salary $1800. SM-6689.

POWER SUPERINTENDENT, technical graduate; 11 years' experience steam electric power plants. Age 35; married; employed; salary $4500. SM-6690.

AUTOMOTIVE ENGINEER. Cornell graduate; 6 years' experience on gasoline engines as designer, chief draftsman, engineer, wants responsible position with engine or automobile manufacturer. SM-6691.

TECHNICAL ENGINEER, age 28; single; 8 years' power plant design and construction, wishes to connect in similar capacity. Salary $225 per month. SM-6692.

SUPERINTENDENT, machinist tool-maker by trade, technical graduate, wide experience organizing, planning and handling help in plants manufacturing interchangeable parts. Age 36; salary $5000. Eastern territory. SM-6693.

PULVERIZED FUEL ENGINEER with 10 years' experience here and abroad in design, construction, operation of complete powdered coal plants and furnaces for all metallurgical purposes. SM-6694.

ENGINEER, mechanical, assistant; age 30; technical graduate; 11 years' experience on machinery and machine tools. Position desired, assistant to works manager, New York City. SM-6695.

TOOL OR PRODUCTION ENGINEER; age 41. Design, build and maintain tool equipment. Planning and control of production. Good mechanic and executive. Location Metropolitan section. SM-6696.

TECHNICAL GRADUATE, with 10 years' experience in mill and power-plant engineering, desires opportunity as manufacturer's representative. SM-6697.

MECHANICAL ENGINEER, 10 years' experience gas engine, tractor, automotive and oil mill design, desires permanent position assistant engineer, chief draftsman, designer or college professor. SM-6698.

WORKS MANAGER. Experienced in the shop methods, systems, and routine. Proved ability to handle labor problems satisfactorily. SM-6699.

PURCHASING AGENT, 17 years' experience automobile manufacturing and steel mill. Broad knowledge materials. Can handle largest proposition. SM-6700.

SALES ENGINEER, M.E.; age 25; 5 years' sales experience charge New York office prominent boiler concern. Familiar architects', engineers', contractors' offices. Desires change with larger opportunity. SM-6701.

SALES ENGINEER; acquainted with manufacturing trade, mechanical lines, in Ohio, Indiana, Michigan, and Detroit; wishes to connect with manufacturer in automotive industry. SM-6702.

INDUSTRIAL ENGINEER; age 31, qualified for research in production, to develop good relations through foremen training. Experienced in textiles. SM-6703.

WORKS MANAGER or Industrial Engineer. Up to date in manufacturing methods. References. Salary $6000. Available September 1. SM-6704.

EXECUTIVE, with 11 years' experience in manu-

facturing and sales. Familiar with construction fabricated apparatus and production multiple parts. SM-6705.

EXECUTIVE ENGINEER; 20 years' experience in manufacture of ordnance and machine products; available at once. Salary $7500. SM-6706.

MECHANICAL AND POWER ENGINEER; technical graduate, 7 years' experience chemical, machine shop, sugar engineering, industrial and power plant practice, operation, design, layout, heating, etc. SM-6707.

STEAM TURBINE ENGINEER, technical graduate, 5 years' experience on small and medium-sized steam turbines. Age 30; married. SM-6708.

EXECUTIVE; Harvard graduate with training in mechanical and electrical engineering, 6 years' in Central Station industry, 5 years' in charge paper mill; available for position in either of these industries. SM-6709.

WORKS MANAGER; desires to connect with progressive manufacturer. 16 years' experience as general superintendent and works manager, familiar with electrical goods, brass novelties, automobile parts, fire-arms, valves and fittings, and modern factory methods. SM-6710.

ENGINEER AND EXECUTIVE in manufacture of mechanical and electrical devices, 15 years' experience. Able to install most up to date methods and systems and show lowest production costs. Would consider only permanent connection with good future prospect. Location East. SM-6711.

EXECUTIVE, proved ability and initiative in power plant problems, refrigeration, factory design, paper industry. Business training; age 31; excellent references. SM-6712.

MECHANICAL ENGINEER, member, technical graduate, B.S., M.E. American; age 38; married. Twenty years' expetience covers shop, designing, engineering and superintending. Desires change as mechanical engineer with sound progressive manufacturing concern. Salary $5000. Will invest if right opportunity offers. SM-6713.

ENGINEER, chemical or allied industry. Extensive experience qualifies for responsible position in operating or engineering staff. Past work demonstrates ability. SM-6714.

TRANSMISSION ENGINEER. Thirteen years experience in design, erection, installation, executive and sales of elevating, conveying and power transmission machinery. SM-6715.

MECHANICAL ENGINEER (Columbia), with six years' experience on generation, distribution and utilization of power, and construction work, seeks position where ability to get results counts. SM-6716.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER SEPTEMBER 19, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geograhically by states, then alphabetically. Unless objection is made to any of the candidates by Sept. 29, 1921, and provided satisfactory replies have been received from the required number of references, final action will be taken by the Council.

Alabama

BENTLEY, GEORGE L., Sales Engineer, Ingersoll-Rand Co., Birmingham
FRIES, J. ELIAS, Chief Engineer, Tennessee Coal, Iron & Railroad Co., Birmingham
PHILLIPS, CLAUDE W., Mechanical Engineer, Woodward Iron Co., Woodward

Arkansas

BEMBERG, JULIUS C., General Manager, Bemberg & Sons Iron Works, Little Rock
BROWN, FRED I., Manager, Arkansas Foundry Co., Little Rock

California

BECKMAN, PHILIP E., Draftsman & Computer, Pacific Gas & Electric Co., San Francisco
BERRY, JAMES F., JR., Estimator & Engineer, Main Iron Works, San Francisco
BROWN, ALLEN B., Engineer, Standard Oil Co., Richmond
BROWN, BRUCE F., Resident Manager & Superintendent, The Paraffine Companies, Inc., Los Angeles
CAMPBELL, CLARENCE P., Mechanical Engineer, Union Oil Company of California, Los Angeles
CLARK, PHILIP C., Oil Field Time Clerk, Associated Oil Company, Fellows
COQUEUGNIOT, GUSTAVE H., Consulting Engineer, Los Angeles
DE BACK, EMERY E., Smith Manufacturing Co., San Jose
EISENBERG, WALTER E., Engineering Consultant, Los Angeles
GREEN, BOYNTON M., Federal Telegraph Co., Palo Alto
JONES, IRA C., Mechanical Engineer, Standard Oil Co., Bakersfield
KALLAM, FLOYD L., Assistant Research Engineer, Associated Oil Co., Fellows
KRATZ, REGINALD P., Production Engineer, Smith-Booth-Usher Co., Los Angeles
MARX, GUIDO V. D., Student of Stanford University, Stanford Univ.
MILLS, EUGENE C., Consulting Hydraulic Engineer, Willows
PHILLIPS, HORACE P., Superintendent, Messe & Gottfried Co., San Francisco
SAUNDERS, ARTHUR B., Chief Engineer, Lane & Stanford Hospitals, San Francisco

Colorado

DITSON, JESSE, Consulting Engineer, Ingersoll-Rand Co., Littleton
DOUGHERTY, VIVIAN C., Salida
McFARLANE, FRANK L., Denver
WILLIAMS, CHESS G., Arms & Ammunition Editor, Outdoor Life, Denver

Connecticut

ANDERSON, FREDERICK E., Terry Steam Turbine Co., Hartford
DECKER, BERNARD C., Lieut., United States Navy, New London
ENGSTROM, ELMER, Master Mechanic & Designer, Willimantic
GATES, FRED P., Superintendent, Hart Manufacturing Co., Hartford
GLIKE, FREDERICK C., Chief Draftsman, Waterbury Manufacturing Co., Waterbury
HALL, HERMAN S., Director, State Trade School, New Britain
HASWELL, RALPH P., Superintendent, Landers, Frary & Clark, New Britain
SHAW, ROBERT D., Superintendent, Ansonia Forest Products Co., Norfolk
SKELLY, GEORGE M., Draftsman, New Departure Manufacturing Co., Bristol
SMITH, CHARLES E., Draftsman, Electric Boat Co., Groton
VON OHLSEN, LOUIS H., Assistant Engineer, Safety Car Heating & Light Co., New Haven
WESTBROOK, RUSSELL T., Assistant Mechanical Engineer, Hartford Electric Light Co., Hartford

Delaware

BLUMBERG, LEO., Instructor, University of Delaware, Newark
MONTGOMERY, C. VANCE, Checker & Estimator, Edge Moor Iron Co., Edge Moor

District of Columbia

BARTRAM, JOHN J., President, Bartram Motors Co., Washington
DRUTZU, SHELCON, Special Attache of the Roumanian Legation, Washington
FORSBERG, GUSTAVE W., Proprietor, G. W. Forsberg Machine, Boiler & Foundry Works, Washington
HALL, DALE C., Captain, Ordnance Department, United States Army, Washington
KRAMER, FRANK H., Supervisory Draftsman, United States Naval Gun Factory, Washington

Florida

COTTON, JAMES E., Division Engineer, Florida East Coast Railway, Key West

Georgia

CARR, CHARLES R., Mechanical Engineer, The Murray Co., Atlanta
POWELL, ELWYN N., Engineer, Bunn Service Co. Newnan
REYNOLDS, WILLIAM, Lubricating Assistant, The Texas Co., Atlanta
ROBINSON, FREDERIC E., Superintendent, Automatic Sprinkler Company of America, Atlanta
WILHELM, GLENN P., Major, Ordnance Department, United States Army, Camp Benning

Illinois

BANCK, HANS J. E., Springfield Boiler Co., Springfield
BEMIS, WALTER S., President, The Bemis Co., Chicago
BROWN, JOSEPH H., District Sales Manager, Sullivan Machinery Co., Chicago
CALDWELL, FRANK B., 2nd Vice President, H. W. Caldwell & Son Co., Chicago
DAY, VINCENT S., Research Associate, University of Illinois Urbana
EIGELBERNER, J., Consulting Engineer & Assistant Director, La Salle Extension University, La Salle
GAUDY, R. JARVIS, Executive Engineer, Sessions Engineering Co., Chicago
GOODNOW, GEORGE F., Consulting Gas Engineer, Chicago
HASEROTH, JOHN H., Mechanical Engineer & Manager, Futrell Coupler Co., Streater
HOTCHKIN, PAUL M., Vice-President & Production Manager, National X-Ray Reflector Co., Chicago
KENNEDY, ROBERT E., Assistant Secretary, American Foundrymen's Association, Chicago
KNOEPPEL, FREDERICK J., Resident Manager, Scovell Wellington & Co., Chicago
KRUEGER, JAMES I., Representative, Illinois Engineering Co., Chicago
LeMOET, FRANK H., President, The Management Service Co., Chicago
LEUNING, EUGENE G., Consulting Engineer, Chicago
MARSILIUS, NEWMAN, General Superintendent, Woodstock Typewriter Co., Woodstock
NACHMAN, HENRY L., Associate Professor, Armour Institute of Technology, Chicago
NELSON, BENJAMIN, Engineer and Sales, Kewanee Boiler Co., Chicago
PEIRCE, FRED M., Chief Inspector, Sangamo Electric Co., Springfield
STEVENSON, WALTER N., Chief Engineer, F. J. Littell Machine Co., Chicago
WARNER, LLOYD W., Investigating Engineer, Union Special Machine Co., Chicago
WILLIAMSON, WILLIAM R., Partner, Williamson & Burgdolt, Chicago

Indiana

DANGEL, HERBERT L., Holland
DARNELL, JOSEPH R., Combustion Engineer, Sinclair Refining Co., East Chicago
EICHHOFF, C. WILLIAM R., Superintendent, Wayne Oil Tank & Pump Co., Fort Wayne
GORDON, CHARLES W., Experimental Engineer, The Superheater Co., East Chicago
HAYNES, PERRY L., Hagerstown
SECOR, JOHN A., Consulting Engineer, Advance-Rumely Co., La Porte
UMLAND, WALTER W., Sales Engineer, Diamond Chain & Manufacturing Co., Indianapolis
VAN ARSDEL, FRED K., Indianapolis

Iowa

BAGBY, RALPH B., Chief Engineer, J. G. Cherry Co., Cedar Rapids
HARROD, OTIS W., Engineer, Sioux City Gas & Electric Co., Sioux City
MEYLING, T. T., Plant Manager, Pechstein Iron Works, Keokuk
WHARFF, EDWARD M., Vice President & General Manager, Hawkeye Oil Co., Waterloo

Kansas

BARRON, WILLIAM W., Testing Engineer, Kansas Gas & Electric Co., Wichita
DARBY, HARRY, JR., Vice-President & General Manager, The Missouri Boiler Works Co., Kansas City

Kentucky

CRULL, HARLEY R., Mechanical Inspector, L. & N. Railroad Co., Louisville
GOTTHARDT, HENRY R., Chief Engineer, The Dow Co., Louisville
KELLY, GEORGE E., Secretary & Manager, Lebanon Light, Ice & Power Co., Lebanon

Louisiana

ELIZARDI, FRANK P., New Orleans
HADDEN, CALLENDER F., Secretary, Standard Supply & Hardware Co., Inc., New Orleans

KALAR, URSUL C. Manager, Fairbanks, Morse & Co., New Orleans
McGRAW, FORBES, Fairbanks-Morse & Co., New Orleans

Maine

HINCKLEY, HAROLD, President, Union Iron Works, Inc., Bangor
MITCHELL, NATHANIEL McD., Superintendent, Hill Manufacturing Co., Lewiston

Maryland

CONEN, JOHN J., Supervisor of Shop Practice, Mt. Clare Shops, Baltimore
COOK, WILLIAM D., Red Cross Institute for Blind, Baltimore
DARRINGTON, PAUL N., Edgewood Arsenal, United States Army, Edgewood
DOUGHTIE, VENTON L., Instructor, Johns Hopkins University, Baltimore
WATERFALL, HARRY W., Associate Professor, The Johns Hopkins University. Baltimore

Massachusetts

BARTLETT, SPAULDING, Treasurer, S. Slater & Sons, Inc., Webster
BINNS, COZART, W. H. Stewart, Boston
BOLTZ, FRED S., Sales Engineer, Patterson Kelley Co., Boston
BRADFORD, ROY H., Superintendent, Smith & Dove Manufacturing Co., Andover
CAMERON, DAMON W., Roberts, Roberts & Cushman, Boston
CAUGHEY, REED J., Chief Engineer, H. M. Haven & Wm. W. Crosby, Boston
COX, WILLIAM P., C. J. Cox Engineering Co., Boston
CURTIS, VARNUM P., Consulting Engineer & General Contractor, Worcester
HALL, ROLAND F., Partner & Manager, Elliot & Hall, Worcester
HALL, WALTER O., Chief Engineer, Golding Manufacturing Co., Franklin
HAMILTON, HAZEL M., Connected with Engineering school of Drawing, Springfield
HOLT, KLATE M., General Electric Co., Lynn
REED, WILLIAM B., Vice-President, The H. B. Smith Co., Westfield
ROBERTS, CHARLES A., Mechanical Engineer, Palmer Mill of the Otis Co., Three Rivers
ROLLAND, GEORGE ALEX, Textile Engineer, Lockwood Greene & Co., Boston
STEPHENS, SAMUEL G., Mechanical Engineer, Hamilton Manufacturing Co., Lowell
FORBES, ROBERT T., New England Manager, Green Fuel Economizer Co., Boston
HAYES, FREDERICK A., President, Industrial Engineering Corporation, Boston
KENNEDY, WILLIAM F., Fall River
LO, CHENG-YAU, Student Engineer, General Electric Co., Lynn
WECHSBERG, OTTO, Vice-President & Chief Engineer, Coppus Engineering & Equipment Co., Worcester
WRIGHT, HENRY S., Junior Partner, Walton & Wright, Springfield

Michigan

BOYCE, FRANK G., Assistant Manager, Consumers Power Co., Jackson
CEDERLEAF, CLARENCE A., Mechanical Appraiser, American Appraisal Co., Milwaukee
CLAY, HARVEY E., Assistant General Manager, Detroit Gear & Machine Co., Detroit
COLE, DONALD, Member of Firm, Wells, Beckwith & Cole, Detroit
GLEESON, FRANCIS T., Sales Engineer, Crane Co., Grand Rapids
HORIUCHI, KEIZO, Ann Arbor
KINGSBURY, HENRY J., Superintendent & Chief Engineer, Hill-Curtis Co., Kalamazoo
LAKE, ELLSWORTH L., Machine Designer, Weis Fibre Container Corporation, Monroe
MOFFETT, HENRY C., Mechanical Engineer, Fargo Engineering Co., Jackson
MURRAY, WILLIAM F., Mechanical Engineer, Wolverine Cement Co., Coldwater
PHELPS, HARRY T., Pyrometer Supervisor, Buick Motor Co., Flint
STEVENSON, EDMUND R., Kelsey Wheel Co., Detroit

Minnesota

BARTHELEMY, PAUL P., General Car Foreman, Great Northern Railway Co., St. Paul
HAYES, EDWARD J., Junior Erecting Engineer, J. G. Robertson, St. Paul
KUHN, LEWIS O., Vice-President & General Manager, Northern Fire Apparatus Co., Minneapolis
MEYER, ADOLPH F., Consulting Engineer, Minneapolis

Missouri

BURKE, ROBERT F., Investigating Engineer, Heine Safety Boiler Co., St. Louis
COTTON, ALFRED, Research Engineer, Heine Safety Boiler Co., St. Louis
GILL, JAMES, St. Louis
GREGG, CECIL D., President, Evans & Howard Fire Brick Co., St. Louis
LANE, RICHARD K., Assistant Operating Engineer, Southern Illinois Light & Power Co., St. Louis
MEIER, CLEMENT R., President & Treasurer, Heine Safety Boiler Co., St. Louis
MITSCH, GEORGE W., Mechanical Engineer, American Car & Foundry Co., St. Louis
O'REILLY, ANDREW J., Consulting Engineer, St. Louis

New Jersey

ANDERSON, CARL O., Designer Draftsman, Kelsey Motor Co., Newark
AUPERIN, JEAN G., Designing Draftsman, American Can Co., Newark
BEANE, GEORGE A., First Assistant Power Engineer E. I. du Pont & Co., Gibbstown
BECH, RASMUS R., Taylor Wharton Iron & Steel Co., High Bridge
BECKER, RUDOLPH, Inventor, Singer Manufacturing Co., Elizabethport
BENEDICT, HARDING, Engineer, C. S. Wood Co., Newark
BERLOWITZ, MAX E., Development Engineer, General Motors Corporation, Harrison
BRIGGS, HENRY C., General Mechanical Foreman, C.R.R. of New Jersey, Jersey City
CHAPIN, ERNEST H., Sales Engineer, Wheeler Condenser & Engineering Co., Carteret
COSTELLO, M. J., Testing Engineer, Babcock & Wilcox Co., Bayonne
DENNISTON, WILLIAM J., Plant Engineer, Oxweld Acetylene Co., Newark
DUNCAN, JOHN M., Master Mechanic, Babcock & Wilcox Co., Bayonne
ELY, FREDERIC G., Tractor Operator, The Oak Ridge Co., Mountain Lakes
FISHER, EDWIN E. A., Occupation Rating Expert, Prudential Insurance Co., Newark
GREEN, WARREN T., Branch Manager, The Mengel Co. Branch, Jersey City
GREENHALL, ELMER A., Knickerbocker Manufacturing Co., Belleville
HETTENBACH, FRED W., Draughtsman, United States Aluminum Co., Edgewater
HOLLINS, GEORGE D., Montefair
JOHNSON, ERIC G., Supervisor, School of Industrial Arts, Trenton
KELLER, A. WM., Croton
LUCAS, GEORGE P., Assistant Master Mechanic, Seaboard By-Product Coke Co., Jersey City
LYON, CHARLES S., Superintendent, Motor Equipment, Standard Oil Co. of New Jersey, Newark
LYONS, OSCAR I., Mechanical Draftsman, Taylor-Wharton Iron & Steel Co., High Bridge
MACKEY, DUDLEY E., President, Mackey X-Ray Accessories Corporation, Newark
MAGEE, GEORGE H., Weehawken
MESSINGER, JOE P., Mechanical Engineer, Standard Oil Co., Elizabeth
MOSES, HAROLD D., Engineering Draftsman, Michelin Tire Co., Milltown
OKSEN, HANS C., Chief Engineer, Pardee Steel Corporation, Perth Amboy
OLSON, CARL E., Drafting Engineer, Babcock & Wilcox Co., Bayonne
PATON, JOHN B., Superintendent of Inspection, General Motors Corporation, Harrison
PETERSON, ARVID, Assistant Chief Engineer, De Laval Steam Turbine Co., Trenton
SHOEMAKER, HARRY L., In charge of Estimating Division—Standard Oil Co., Elizabeth
SPIELVOGEL, JOSEPH, Efficiency Engineer, Mechanical Efficiency Co., Newark
STRACHAN, CHRISTOPHER, Hoboken
THORSEN, MARTIN, Manager, Wallace & Tiernan Co., Inc., Newark
UDERITZ, HARRY G., Draughtsman, Babcock & Wilcox Co., Bayonne
VOIGT, ALBERT G., Magor Car Corporation, Passaic
WALDRON, WILLIAM H., Vice-President, John Waldron Co., New Brunswick
WARD, ROBERT N., Manager, Hamilton Garage, Jersey City
WILLIAMS, EARL R., In charge of Electrical Research Laboratory, Johns Manville, Inc., Manville
YAHLE, EARL I., Master Mechanic, R. J. Reynolds Tobacco Co., Jersey City

New Mexico

GULDBERG, D. H., Designer, Chino Copper Co., Hurley

New York

ALEXANDRO, FRANK J., Draughtsman, New York Edison Co., New York City
ALLEN, LAVONT C., Plant Engineer, Willys Corporation, Syracuse
BAILEY, J. LLOYD, Directing Automotive Engineer, The Texas Co., New York City
BAKER, RALPH G., Kerr Turbine Co., Wellsville, N. Y.
BASORA, FRANCISCO L., Purchasing Agent, Kelvin Engineering Co., Inc., New York City
BEAVER, JOHN W., Estimator, Allied Machinery Company of America, New York City
BEUTEL, ROBERT J., Mechanical Engineer, Beutel & Rush, Brooklyn
BROWN, GORDON D., Business Builders, New York City
BROWN, ROBERT S., Vice-President, G. M. Basford Co., New York City
BROWN, RUSSELL G., Warren Webster & Co., New York City
BRUSH, THOMAS V., Chief Engineer, Plaza Hotel, New York City
BRYAN, PERCY A., Rochester
BUCHANAN, GEORGE, Vice-President, Long Island Foundry Co., Inc., Long Island City
BURKE, THOMAS F., Assistant Engineer of Car Equipment, Interborough Rapid Transit Co., New York City
BURNS, EDWIN F., Eastman Kodak Co., Rochester
BUTLER, CHARLES A., Engineering Salesman, Crosby Steam Gage & Valve Co., New York City
CANNON, GARRIT S., Secretary, International Engineering & Financing Corporation, New York City
CAWLEY, GEORGE, The Permutit Co., New York City
COLLINS, THOMAS, JR., Tool & Machine Designer, American Separator Co., Bainbridge
COLLINS, THOMAS, SR., President, American Separator Co., Bainbridge
CONNETTE, THOMAS W., President, C.J.H. Service Corporation, Buffalo
CONNOR, ALLEN E., Supervising Engineer, C. E. Knoeppel & Co., New York City
COZZENS, JOHN H., Engineer, Western Electric Co., New York City
CROSBY, E. S., Manager, Eastern Division, Celite Products Co., New York City
CURTIS, FRANK W., Chief Engineer, Dowd Engineering Co., New York City
CURTISS, NATHAN A., Chief Draftsman, Eagle Pencil Co., New York City
DAGGETT, ROBERT G., The Linde Air Products Co., New York City
DAVIDSON, CHARLES L., Superintendent Power Stations, New York Central Railroad, New York City
DAVISON, RALPH C., Engineering Salesman, American Abrasive Metals Co., New York City
D'HEDBERG, GEORGE Y., Studying American Industrial Conditions, New York City
DIALOGUE, JOHN H., Engineer, Luckenbach Steam Ship Co., Inc., Brooklyn
DIEFENBACH, ROY J., Student Sales Engineer, Worthington Pump & Machinery Corporation, Buffalo
DOERR, ROBERT C., Sales Engineer, M. K. Bowman Edson Co., New York City
DROMGOOL, THOMAS J., Brooklyn
DURYEA, JESSE T., President, Pierce Butler & Pierce Manufacturing Corporation, New York City
EICHLER, ALFRED J., Vice-President & General Manager, Walworth International Co., New York City
EICKEMEYER, CARL, Consulting Engineer, Brooklyn
ELLS, ANDREW D., Local Manager, United States Shipping Board, New York City
EPSTEIN, HAROLD, Superintendent of Construction, The Foundation Co., New York City
ERIKSEN, EINAR J., Mechanical Engineer, Ford, Bacon & Davis, New York City
ERICKSON, HARRY A., 3rd Assistant Engineer, Steamship Bensalem
ESSIG, ADOLPH F., Chief Draftsman, National Meter Co., Brooklyn
FARRELL, L. EDWARD, Stewart M. Marshall & Chas. Page Perin, New York City
GENT, RUFUS T., General Superintendent, New York Trap Rock Corporation, New York City
GINSBURG, ABRAM Brooklyn
GOW, ARTHUR C., Engineer, American Telephone & Telegraph Co., New York City
GREENE, HARDING U., The J. G. White Management Corporation, New York City
HAYNES, CHESTER H., Engineer, Western Electric Co., New York City
HEID, EDWARD J., Draftsman, Machine & Die Designer, Doehler Die Casting Co., Brooklyn
HENDERSON, DOUGLAS, Chief Engineer, Fuel Engineering Co., New York City (Re-election)
HEVENOR, HERMAN P., President of Engel & Hevenor, Inc., New York City
HILL, EDGAR G., Engineer, Ford, Bacon & Davis, New York City
HINES, GEORGE E., Chief Engineer, Ulen Contracting Corporation, New York City

JAFFRAY, KENNETH B., Student at Cornell University, Ithaca
JOHNSON, E. WALTER, Assistant Chief Draftsman, R. S. Kent, Inc., Brooklyn
KEESLER, ALBERT A., President, Watson Products Corpn., Canastota
KORMINSKY, ABRAHAM, New York City
KURSHEEDT, ROLAND S., New York City
LAWRENCE, FRANK V., General Manager, Interstate Equipment Corporation, New York City
LONG, JOSEPH W., Lieutenant, United States Naval Reserve Force, Steamship Neptune
LUCAS, JOSEPH A., Chief Draftsman, McGraw Hill Co., New York City
LUNDBERG, OSCAR F., Mechanical Engineer, Otis Elevator Co., New York City
MANGELS, LESTER A., Brooklyn
MARION, FREDERICK R., American Telephone & Telegraph Co., New York City
MAUS, FRANK J., Engineering Assistant, Western Union Telegraph Co., New York City
MAYNARD, BENJ. M., Chief of Industrial Engineering Staff, Miller Franklin Basset & Co., New York City
MERTON, LESLIE R., New York City
MESLON, WILLIAM J., Superintendent's Assistant, Standard Gas Light Co., New York City
MICHAL, JAROSLAV A., Mechanical Engineer General Chemical Co., New York City
MOFFAT, DAVID L., Superintendent, Engineer in Chief Standard Shipbuilding Co., Shooters Island
MOLITOR, FREDERIC A., Consulting Engineer, New York City
MOMBERGER, WILLIAM J., Engineer, Gibbs & Hill, Consulting Engineers, Pennsylvania Station, New York City
MONROE, A. KING, General Superintendent, United States Light & Heat Corporation, Niagara Falls
MOULD, ARTHUR E., In business for self, Rochester
MUNN, HARVEY T., Engineer, National Board of Fire Underwriters, New York City
NOYES, EDWIN M., Assistant to Secretary, Adams Laundry Machinery Co., Troy
O'BRIEN, BERNARD C., Eastern Manager, The Connersville Blower Co. New York City
OFELDT, ERNEST G., President & General Manager, Ofeldt Gas Fired Boiler Co., Nyack
PACKARD, A. APPLETON, Instructor in Physics, Syracuse University, Syracuse
PALM, ROBERT, Supervisor, American Sugar Refining Co. New York City
PEABODY, JOHN M., Design Engineer, Western Electric Co., Inc., New York City
PEARE, WILLARD C., Assistant to Rate Engineer, New York Edison Co., New York City
PETER, WALTER J., Automobile Designer, Brewster & Co., Long Island City
PEVERLEY, RALPH ST. L., Engineer for H. H. Robertson, New York City
POTTER, JAMES, Terminal Engineering Co., New York City
RIONDA, LEANDRO J., Vice-President, Czarnikow-Rionda Co., New York City
ROBERTS, ALEXANDER P., Assistant Service Engineer, Air Reduction Sales Co., New York City
RAYMO, FRED G., Schwartz, Seymour & Co., Inc., New York City
ROSS, WILLIAM, Works Manager, Niagara Electro-Chemical Co., Niagara Falls
RUNGE, ROBERT F., Vice-President, S.K.F. Industries, Inc., New York City
SCHADE, ALFRED A., Assistant Engineer, G. Koetter, New York City
SCHNEIDER, ALWIN W., The American Brass Co., Buffalo
SCHORER, ERNEST, Superintendent, G. B. Manufacturing Co., Hempstead
SCHUYLER, WILLIAM A., President & General Manager, Scintilla Magneto Co., Inc., New York
SCOLLAY, ULYSSES G., President, John A. Scollay, Inc., Brooklyn
SECOLES, JESSE, Engineer, George C. Stoddard, New York
SEMON, JOSEPH C., Associate Member of Greiner Semon Loury Co., Syracuse
SENN, GEORGE, Guggenheim Brothers, New York
SHEPARD, EDWARD C., Field Superintendent, Johns-Manville, Inc., Syracuse
SINCLAIR, LOUIS B., Senior Engineer, U. S. Shipping Board Emergency Fleet Corporation, New York
SIVEWRIGHT, WILLIAM W., President, Angus Engineering Co., New York
SKOUGOR, HJALMAR, Consulting Industrial Engineer, New York
SMALL, JOHN S., Consulting Industrial Expert, New York
SPOONER, HENRY W., Engineer, Foundation Co., New York
STEWART, SPENCER W., President, Stewart Engineering Corporation, New York
STRAUSS, JOHN N., Salesman, "Business Builders," New York
THEWLIS, GEORGE D., Engineer, American Car & Foundry, New York City
TRABOLD, HERMANN S., Production Superintendent, The National Oven Co., Glenham
TRIPP, LOUIS H., Supervising Inspector, Baltic Steam Ship Corporation of America, New York
TROSCH, ALFRED, Chief Engineer, Betts Machine Co., Rochester
TROSTLER, HERMA M., New York
VINCENT, HARRY S., Assistant to Vice-President, Lima Locomotive Works, Inc., New York
WAGNER, JOSHUA, Member of Firm and Designing & Sales Engineer, Progressive Corrugated Paper Machinery Co., Brooklyn
WATSON, DAVID R., New York
WEAVER, LEON H. A., George H. Gibson Co., New York
WEBSTER, FRED B., Simmons-Boardman Publishing Co., New York
WEHMAN, FRED C., Construction Superintendent, Walter Kidde & Co., Inc., New York
WEISSGOLD, DAVID J., Mechanical Draftsman (Experimental), Remington Typewriter Co., New York
WHIPPLE, JACK VAN H., Assistant Engineer, W. N. Dickinson, New York
WILL, ROLAND T., General Manager, The Will Corporation, Rochester
WILLIAMS, MILTON S., Engineer, Williams Motors, Inc., New York
WITTE, FELIX, Chief Draftsman, Zaremba Co., Buffalo
WYLLIE, JOHN S., Machine Designer, Peirce Accounting Machine Co., New York

North Carolina

WALTERS, SIDNEY J., Oxford
YOUNG, Charles V., Chief Engineer, Standard Ice & Fuel Co., Charlotte

Ohio

AVERILL, WILLIAM D., Lunkenheimer Co., Cincinnati
BALTHAZAR, JOSEPH E., Assistant Efficiency Engineer, The Pittsburgh Plate Glass Co., Barberton
BRECKENRIDGE, DONALD E., Sales Engineer, Colburn Machine Tool Co., Cleveland
BURNSIDE, EDWIN A., Captain, Manager of Transportation, The Campbells Creek Coal Co., Cincinnati
CONSTABLE, CHARLES E., Wadsworth Watch Case Co., Cincinnati
DONOVAN, JOHN F., Manager of Equipment Development Division, National Lamp Works of General Electric Co., Cleveland
DUEZ, LOUIS B., Chief Engineer, Chas. E. Bedaux Co., Cleveland
FRIES, DANIEL G., Instructor, Portsmouth High School, Portsmouth
GALLAGHER, THOMAS G., Assistant General Manager, The Continental Sugar Co., Toledo
GALVIN, JOHN E., President, The Ohio Steel Foundry Co., Lima
GOLDBERG, MAXIMILIAN M., Inventor, The National Cash Register Co., Dayton
HAAS, ELWOOD A., Dayton
HENSHAW, LEWIS J., Cincinnati
HUCKE, ELMER F., Elmwood Place
HYDE, TOM B., National Carbon Co., Inc., Cleveland
JAROSZYNSKI, LOUIS, Draftsman, The Wellman-Seaver-Morgan Co., Cleveland
LOTZ, CHARLES W., Combustion Engineer, M. A. Hanna & Co., Cleveland (Reinstatement)
LYKE, FRED J., Superintendent, American Multigraph Co., Cleveland
MAGGS, ALBERT H., Designing Engineer, The Ahrens Fox Fire Engine Co., Cincinnati
MILLER, J. MACKENZIE, Aeronautical Mechanical Engineer, Air Service, Dayton
MITCHELL, CALVIN D., J. T. Wright Book Binding Machinery Co., Cincinnati
MITCHELL, RALPH A., Superintendent, Pollak Steel Co., Cincinnati
MITCHELL, RAYMOND C., Superintendent, The Webster & Perks Tool Co., Springfield
MITSCH, EDWARD H., Union Gas & Electric Co., Cincinnati
OSBORN, CYRUS R., Draftsman, B. & O. R. R., Cincinnati
PARSONS, BEN G., Chief Engineer, Dayton Wire Wheel Co., Dayton
RATAICZAK, THOMAS F., Executive Engineer, The Hobart Manufacturing Co., Troy
REUTER, PETER T., Cadet Engineer, Bailey Meter Co., Cleveland
ROSS, CARROLL A., Engineer, Piqua Handle & Manufacturing Co., Piqua
RUTHENBURG, LOUIS, Superintendent, The Dayton Engineering Laboratories Co., Dayton
SAWTELLE, ELMER S., Assistant General Manager, Tool Steel Gear & Pinion Co., Cincinnati
SCHAUFELE, WM. HENRY, JR., The O. Armleder Co., Cincinnati
SCHUBERT, EDWARD H., Assistant Superintendent, Weir Frog Co., Cincinnati
SCOTT, ALEXANDER N., 2nd Vice-President & Factory Manager, Diebold Safe & Lock Co., Canton
SNEATH, WILLIAM H., Consulting Engineer, National Carbon Co., Ltd., Cleveland
SORIN, EUGENE, Cincinnati
STRIETELMEIER, EDWARD C., Student Secretary, University of Cincinnati Y. M. C. A., Cincinnati
VOLLMER, PAUL L., Chief Draftsman, Francis M. Case, Cleveland
WEIHL, ALBERT C., General Works Manager, The Pollak Steel Co., Cincinnati
WILLIAMS, GEORGE M., General Manager, Dayton Wright Co., Dayton

Oklahoma

COKER, MARION B., Draftsman and Assistant Engineer, Gypsy Oil Co., Tulsa
GREENSHIELDS, BRYCE W., Consulting Engineer, Marland Refining Co., Ponca City
REID, WALTER, JR., Manager of Production Department, Oklahoma Natural Gas Co., Tulsa
VINSON, BAILIE W., Manager, Vinson Sales Service, Oklahoma City

Oregon

LUSTIG, ARTHUR J., Practising Mechanical Engineer, Portland

Pennsylvania

ANDERS, HERMAN F., Chief Draftsman, The Barrett Co., Frankford, Philadelphia
AXFORD, HERBERT, Sales Engineer, A. S. Cameron Steam Pump Works, Scranton
BRAGDON, GEORGE D., Chief Inspector, General Accident F. & L. Corp., Philadelphia
BRIGGS, HERBERT, JR., Powers Stations Dept. Duquesne Light Co., Pittsburgh
BUOY, CHESTER D., Mechanical Engineer, Erie Forge & Steel Co., Erie
BURKHART, LOUIS H., Chief Engineer, Struthers-Wells Co., Warren
DANZER, RUSSELL WILLIAM H., Draftsman, Pennsylvania System, Altoona
DENUCCIO, GUIDO R., Estimator, Standard Steel Car Co., Butler
DILCHER, HENRY S., Assistant Secretary, The Petroleum Iron Works Co., Sharon
DOWNS, WM. FINDLAY, Head of Public Utility Service Department, Day & Zimmerman, Philadelphia
EKSERGIAN, RUPEN, Engineer, Baldwin Locomotive Works, Philadelphia
GREER, EVERETT S., Assistant Superintendent, Factory No. 2, Hazel Atlas Glass Co., Washington
HALL, ALONZO H., Draftsman, Barrett Chemical Co., Frankford, Philadelphia
HARRIS, FREDERIC R., Rear Admiral, United States Navy, Philadelphia
HOMAN, ROBERT M., Draftsman, E. A. Moore Iron Foundry, Reading
HULSIZER, ROBERT L., Susquehanna Collieries Co., Lykens
KARNS, FREDERICK PHILLIP, General Manager for S. T. Karns Sons Co., Franklin
KERIVAN, JOHN ARTHUR, General Master Mechanic, Subsidiary Limestone Co., Carnegie, Steel Co., New Castle
LEHMAN, J. GEORGE, First Vice-President and General Manager, Bethlehem Foundry and Machine Co., Bethlehem
LLOYD, WILLIAM, President, Coxe Stoker Sales Co., Hazelton
MEENEN, RICHARD J. A., Mechanical Engineering Student Pressman, Curtis Publishing Co., Philadelphia
MILLER, FRANK P., General Manager, McCrosky Tool Corporation, Meadville
MILLS, JEREMIAH P., Inspector, Wm. Cramp Ship and Engine Building Co., Philadelphia
MURRAY, H. D., Chief Engineer, Bessemer Gas Engineering Co., Grove City
MYERS, WILLIAM K., Valuation Manager, Philadelphia Rapid Transit Co., Philadelphia
PINES, CHARLES A., Steam Engineer, Atlantic Refining Co., Philadelphia
SMITH, BYRON V., Designer Barrett Manufacturing Co., Frankford, Philadelphia
SMITH, GEORGE EDWARD, Chief Engineer, American Engineering Co., Philadelphia
SMITH, HUBERT P., Vice-President and Secretary, Pittman-Smith Engineering Co., Pittsburgh
SNYDER, HARRY E., Partner, Nelson, Lodge & Snyder, Widemer Building, Philadelphia
SNYDER, JOHN A., Supervisor of Operation, Pennsylvania Power and Light Co., Harwood Mines
SORBER, MILTON P., Superintendent, Tools Department, East Pittsburgh

TOD, JAMES R., Technical Apprentice, Westinghouse Electric Manufacturing Co., Philadelphia
TRAUTWINE, JOHN CRESSON, JR., Editor and Publisher of "Trautwine," The Civil Engineer's Pocket-Book, Philadelphia
TRUXAL, ORIN S., Special Machine Designer, Westinghouse Electric Manufacturing Co., East Pittsburgh
WALLIS, WILLIAM B., Vice-President of W. E. Moore & Co., Pittsburgh
WALRATH, EDWARD JUDSON, General Superintendent, Ball Engine Co., Erie
WICKERSHAM, JOHN HOUGH, Designing & Constructing Engineer, John H. Wickersham Breneman Bldg., Lancaster
WILDT, EDWARD A., Construction Engineer, Scranton Coal Co., Scranton
WURST, HOWARD J., Draughtsman, The Barrett Manufacturing Co., Frankford, Philadelphia

Rhode Island

COLEMAN, JOHN BENEDICT, Chief Engineer, Grinnell Co., Inc., Providence
JOHNSON, HARRY B., Plant Manager, General Fire Extinguisher Co., Providence
McEVOY, CHARLES D., Superintendent, Wanskuck Co., Sterre Mill, Providence
MAHER, PAUL L., Consulting Engineer, Woonsocket
PAINE, WILLIAM HOWARD, Consulting Engineer, Union Trust Building, Providence

Tennessee

MASON, JOHN W., JR., Sales Engineer, The Walsh & Weidner Boiler Co., Chattanooga

Texas

ATHERHOLT, GORDON M., Technical Engineer, Gulf Refining Co., Port Arthur
BRITT, ELBERT G., Construction Superintendent, Southwest General Electric Co., Dallas
GARY, FRANCIS PHINIZY, Sales Manager, Carver Cotton Gin Co., Dallas
MJELLEM, FRANTZ O., Port Engineer, Humble Oil & Refining Co., Houston
ROSENFELT, SAMUEL D., District Manager, Franklin Railway Supply Co., Inc., Dallas

Utah

CAHOON, LEONARD, Engineer and Superintendent of Shops, The Galigher Machinery Co., Salt Lake City
CLARK, HIRAM W., Chief Smoke Inspector, Salt Lake City Corporation, Salt Lake City
WILSON, WILLIAM A., Consulting Mining Engineer, Salt Lake City

Virginia

KORTE, RAYMOND B., Draftsman in charge of checking, The N. & W. Railway Co., Roonoke
BENNINGTON, GUY B., Erecting Superintendent, Clinchfield Carbocoal Corp., South Clinchfield
CHAMBERS, LINCOLN B., (Major) Coast Artillery Corps, U. S. Army Fort Monroe
COFFMAN, BENJAMIN J., Assistant Mechanical Engineer, Richmond, Fredericksburg and Potomac Railroad Co., Richmond
McGAHEY, ROBERT E., Master Mechanic, Richmond, Fredericksburg, and Potomac Railroad Co., Richmond
WOLFE, LAWRENCE P., Assistant Chief Engineer, West Virginia Pulp and Paper Co., Covington

Washington

DAVIS, CHARLES G., Power Engineer, E. I. duPont de Nemours & Co., Du Pont
DOVE, CHARLES V. E., Consulting Engineer, Seattle

West Virginia

BENICA, CHARLES W., Leading Chief Draftsman, Virginian Railway, Princeton
GRUMBEIN, JOHN B., Professor, Steam & Experimental Engineering, Morgantown
LEWIS, HENRY C., Superintendent of Manufacturing Department, Charleston Electric Supply Co., Charleston

Wisconsin

JURGENSEN, JOHN, Supervising Engineer, The Falk Corporation, Milwaukee
LOGEMAN, ALBERT E., Secretary and General Manager, Peoples' Water, Light and Power Co., Mellen, Ashland County
MAC NEVLIE, MARTIN B., Engineer in Charge, Centrifugal Pump Department, Beloit
MULLER, RICHARD FROTSCHER, Student, Allis-Chalmers Manufacturing Co., Milwaukee
PURSEL, HAROLD R., Student Engineer, Worthington Pump & Machinery Corp., Cudahy
SCHUMANN, ALEXANDER P., Chief Engineer, Machine Tool Department, Pawling and Harnischfeger, Milwaukee
TENNEY, FRANK L., Works Engineer, Beloit Iron Works, Beloit
XISTRIS, THEODORE E., Valley Iron Works Co., Appleton

British West Indies

BARRON, EDMUND WM., Collins Green Cross Roads, Kingston, Jamaica

Canada

CASS, GEORGE H., Mechanical Superintendent G. W. McFarlane Engineering Co., Paris, Ontario
DEWHURST, RICHARD M., Assistant Manager of Sales, Standard Underground Cable Co., Hamilton, Ontario
DUGGAN, GEORGE Herrick, President, Dominion Bridge Co., Montreal
GARLAND, JAMES, General Superintendent, Dominion Engineering Works, Montreal
HILL, EDGAR R., Factory Manager, Canadian Ironing Machine Co., Woodstock, Ont.
HUESTIS, HARRY E., Engineering Contracting on his own account, Quebec
JONES, JAMES D., General Manager, Algoma Steel Corporation Ltd., Sault Ste. Marie, Ontario
LABBE, ARTHUR, Mechanical Draftsman, Jenkins Brothers, Limited, Montreal
LATHROP, DANIEL W., Vice-President and General Manager, Canadian Atlas Crucible Steel Co., Welland, Ontario (Re-Election.)
PEARCE, FREEMAN C., Electrician, Hydro-Electric Power Co., Niagara Falls, Ontario
REED, STEPHEN ALEXANDER, Superintendent, Plymouth Cordage Co., Welland, Ontario
SCHOEN, HARRY HERBERT, Mechanical Engineer, Laurentide Co., Limited, Grand Mere, Quebec
TOWNSEND, CHARLES J., Member of Firm, Russell Construction Co., Limited, Toronto
WESTBYE, PEDER P., Vice-President and General Manager, Wm. Hamilton Co., Limited Peterboro, Ontario
WHARTON, WILLIAM H., Sales and Consulting Engineer, Canadian Allis Chalmers, Limited, Toronto

Cuba

ADAMS, HAROLD F., Manager of Bank Premise Department, Royal Bank of Canada
FRANKEL, PHILIP, Chief Engineer, Anglo-Mexican Petroleum Co., Havana
PINO, ERNESTO, Manager of the National Automobile Co., of Cuba, Havana

India

THAKER, SHANKERLAL H., Professor of Mechanics and Electrical Engineering, Kala-Bhavan Technical Institute, Baroda
THAKOR, AGITRAY C., Chief Engineer, Water Works, Ahmedabad Municipal Corporation, Ahmedabad

Japan

WATANABE, JOKICHI, Consulting Engineer of Japanese Government Railways, Tokyo-Fu

Mexico

HURTADO, LEOPOLDO, JR., General Manager, Hurtado and Co. Uruapan, Michoacan

Newfoundland

JUDGE, THOMAS F., Anglo, Newfoundland and Development Co., Grand Falls

Philippine Islands

FLETCHER, DOUGLAS P., Manager, Engineering and Machinery Department, Smith, Bell and Co., Manila
VALENCIA, FELIX V., Chief Engineer, The Hinigaran Sugar Plantation, Inc., Hinigaran, Occidental Negras

Porto Rico

COCHRAN, ALEXANDER R., Canovanas

South America

GALLOWAY, FRANK MADISON, Master Mechanic, Frigorifice Armour de LaPlata, Santiago, Argentine Republic

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Connecticut

MARCY, LYLE B., Industrial Engineer, The Waterbury Manufacturing Co., Waterbury

New Jersey

GETZ, CHARLES H., Works Manager, Gould & Eberhardt, Newark

New York

SHAW, SAMUEL, Dwight P. Robinson Co., New York

PROMOTION FROM ASSOCIATE MEMBERS

California

ROBINSON, PARKER M., Sales Engineer, Westinghouse Electric & Manufacturing Co., Los Angeles

Illinois

CUNNINGHAM, JAMES D., President, Republic Flow Meter Co., Chicago

Michigan

HOPKINS, RALPH Z., Plant Superintendent, Hudson Motor Co., Detroit

New Jersey

CROWLEY, GUY F., Designer, N. Y. Shipbuilding Corp., Camden

New York

BRENGEL, FREDERICK J., Sales Engineer, Whitlock Coil Pipe Co., New York

Oregon

MEANY, JAMES M., President, Bell Engineering Co., Portland

Pennsylvania

REMMERS, HENRI L. W., Construction Engineer, The Barrett Co., Frankford, Philadelphia

Texas

CROSS, WALLACE J., Construction Engineer, Pierce Oil Corp., Fort Worth

Utah

BELCHER, PAUL W., Salt Lake City

Cuba

ULBRICHT, TOMLINSON C., President, Atlantic Trading Co., Habana

PROMOTION FROM JUNIOR

Colorado

McCLINTOCK, CLYDE H., Mechanical Engineer, The Denver Tramway Co., Denver
PERSON, HOWARD A., Superintendent of Power Production, Trinidad Electric Trans. Ry. & Gas Co., Trinidad

Kansas

HELPBRINGER, J. N., Superintendent of Power Kansas Gas & Electric Co., Wichita

Maryland

GAIL, GEORGE WM., JR., Combustion Engineer, Standard Oil Co., Canton

Missouri

BEST, JESSE L., Superintendent, Missouri Utilities Co., Mexico
HOWELL, ARTHUR K., St. Louis

New Jersey

GESSELL, WILLIAM H., General Superintendent, Lehn & Fink Inc., Bloomfield
JAGER, GEO. W., Engineer, Geo. A. Ohl Co., Newark
SCHAPHORST, WM. FREDERICK, Consulting Engineer, New Method Utilities Co., Newark

New York

PALMER, BRIAN O., Chief Engineer, American Taximeter Co., New York
PATERSON, LESTER E., Mechanical Advisor to General Purchasing Agent, American Locomotive Co., New York
SCHIEFER, FREDERICK W., Manager, Rochester Branch, Henry Prentiss & Co., Rochester
STOWELL, HOWARD E., Research Department, The Carborundum Co., Niagara Falls

Ohio

BROWN, ALEXANDER C., President, The Brown Hoisting Machinery Co., Cleveland

Pennsylvania

GERLITZKI, HARRY E., Research Engineer, Armstrong Cork Co., Lancaster
McVETTY, PERCY G., Assistant Superintendent, Practice Dept., Jones & Laughlin Steel Co., Pittsburgh
WINTERLING, CLEE C., Steam Engineer, Carnegie Steel Co., Clairton

Vermont

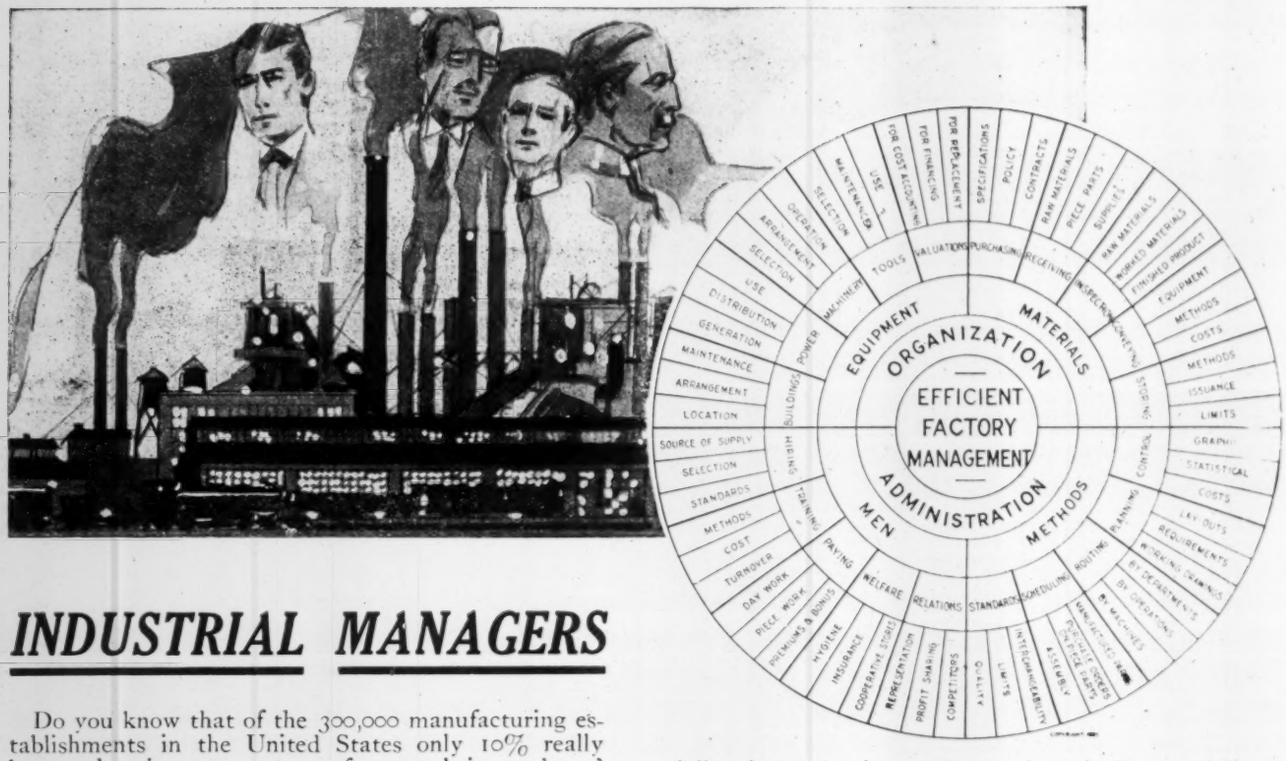
HUBBARD, GUY, Engineering Dept., The National Acme Co., Windsor

Canada

RUDDY, WILLIAM, Foundry Superintendent, Grinnell Co. of Canada Ltd., Toronto, Ontario

SUMMARY

New Applications	459
CHANGE OF GRADING:	
Promotion from Associate	3
Promotion from Associate-Member	10
Promotion from Junior	19
Total	491



INDUSTRIAL MANAGERS

Do you know that of the 300,000 manufacturing establishments in the United States only 10% really know what it costs to manufacture their products? Do you know that approximately 33% of them do not earn one cent on their investment? And that almost 50% of the remaining manufacturing plants only make about $5000 profit in a year?

The tremendous waste in our production year by year has been kept hidden very largely for the reason that 90% of our manufacturers have not possessed the means of ascertaining this waste.

How are we going to correct this condition? Certainly it is evident that the primary cause has been ignorance of the fundamentals of modern Industrial Management. Ignorance not only on the part of plant owners but also on the part of the men who have been entrusted with the Management of these plants, and who have persistently used rule of thumb methods.

The solution of the problem is to place only trained men in management positions. Men who understand thoroly all factors which pertain to plant operation and the management of a big industrial organization at work. Under the guidance of such men production will become more efficient, workers more contented and industry more prosperous.

Now where are these Industrial Managers to come from?

Most of them will come from the great army of men who are now engaged in industrial work, regardless of their immediate occupation. But experience shows that the man who has received his training at a technical school or college has the best chance. His chance to become an Industrial leader is one in 40, whereas the man who has had only an elementary school education has only one chance in 9000.

It is your duty as an engineer to supplement your training with a thoro review of the most recent and successful practices in the field of industrial engineering.

The Industrial Extension institute with the cooperation of more than sixty prominent engineers and specialists in production work prepared the Factory Management Course and Service.

It is an organized Course of home reading and study which includes the essence of the successful and practical experiences of these men, and illustrations of the correct applications of the principles which they have established in many years of practice. It is the only Course of its kind and it exactly parallels the university plan of study.

The Institute functions in the field of industrial engineering and management. The Institute staff suggests and advises on industrial problems. It is constantly doing research work to establish and perfect new and better industrial methods.

Perhaps you are a mechanical engineer of wide experience or again you are a young man who has just graduated from a technical school.

The Institute and its staff consisting of men you know or have heard of, Knoeppel, Roe, Farnham, Going, Myers, Franklin, Babson, and many others are at your Service.

We have an interesting booklet, "Thinking Beyond Your Job" that tells you everything you want to know about the Factory Management Course and Service. It will be sent to you without obligation on your part if you will fill out the coupon below and mail it today.

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Engineering
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In Two Sections—Section Two

MECHANICAL ENGINEERING

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Vol. 43, No. 10 — A.S.M.E. AFFAIRS — October, 1921

CLIPPINGS SHOW PRESS INTEREST IN ENGINEERING

Over 200 Items of A.S.M.E. Activity Treated in Daily Press in Past Year

During the past year the doings of engineers have proved of unusual interest to the general public and have attracted the attention of news writers. The American Society of Mechanical Engineers has been particularly fortunate in its treatment by the public press. The illustration below shows a very few of the great number of clippings that have been received from all parts of the country about the professional activities of our Society.

Over two hundred different news items relating to Society activities were treated in the daily press during the past year. A record of the circulation achieved by each item is carefully main-

(*Continued on page 114*)

AERONAUTIC DIVISION DEPLORES LOSS OF ZR-2

A.S.M.E. and S.A.E. Join in Expressing Sympathy for Relatives and Friends of Dead Aeronauts

The chairman of the Aeronautic Division, Mr. Joseph A. Steinmetz, who is also president of the Aero Club of Pennsylvania and is noted for his work with dirigibles, and who was in Paris at the time of the ZR-2 (R-38) disaster, expressed the sympathy of both our society and the Society of Automotive Engineers on the occasion of the catastrophe. Mr. Steinmetz's message and the acknolwedgment from the American Embassy are printed below.

"COMMANDER H. L. PENCE, U. S. NAVY,
Acting Naval Attaché, American Embassy,
London, England.

Dear Sir:

The American Society of Mechanical Engineers and the Society of Automotive Engineers of America extend their heartfelt sympathies to the families, relatives and friends of the brave aeronauts who gave their lives for their countries and for the advancement of science in the tragedy

(*Continued on page 115*)

LOCAL SECTIONS IN LARGE CITIES PLAN 1921-22 PROGRAMS

Possibilities of Coöperation of Professional Divisions in Local Section Work

The meeting of the Metropolitan Section of the Society at New York City on September 23 was the first of the big-city meetings of the 1921–1922 season. From tentative programs which have been submitted it appears that this was a meeting typical of many of those to be held through the year by the larger sections in different parts of the country, in that the subject under consideration—snow removal—dealt with a problem of importance not only to engineers but also to the general public. This is indicative of the increased and *active* interest which engineers everywhere are taking in public problems.

Joint Meetings to be Held

The programs also show that different engineering societies are working together on these problems. New York, for instance, will hold one joint meeting with the Society of Automotive Engineers and four joint meetings with the American Institute of Electrical Engineers, in three of which the American Society of Civil Engineers will participate. Among the subjects for these meetings, all of which will be held in New York City, are Engineering Financing, Port of New York, Industrial Power, Hudson River Bridge, and Public Relations.

Chicago will consider, in general, engineering education and notable features of recent engineering construction work. It will hold three joint meetings with the mechanical section of the Western Society of Engineers, dealing with technical subjects and general engineering experience. Power, Steel-Mill Operation, and the Mechanical Handling of Freight are among the subjects listed.

The Philadelphia Section, following last year's example, plans to hold four joint meetings with the Engineers' Club of Philadelphia. The Philadelphia Chamber of Commerce may also cooperate in a symposium on materials handling, and the Philadelphia Textile Manufacturers' Association in a Textile Symposium. There will also be a meeting devoted to Philadelphia City Planning, a Public Utility Night, and an annual joint reunion with the Philadelphia section of the A.I.E.E.

The Fuel Problem To Be Considered

Boston's program shows a meeting on combustion with special reference to the fuel problems of New England, a discussion of the engineering features of the St. Lawrence River Project, a consideration of the railroad problem of New England, with special reference to freight handling and competition of the motor truck, and a joint meeting with the Massachusetts chapter of the American Society of Heating and Ventilating Engineers, at which Recent Applications of Air Conditioning will be the subject.

The Cleveland Section reports that it will also consider the fuel problem, with special reference to pulverized and liquid fuels. Superpower is the proposed subject of its January meeting.

The tentative programs also list a number of technical subjects. New York will hold six or eight meetings of a purely technical type, probably in coöperation with the Professional Divisions of the Society. In addition to that on the Snow Removal Problem, which was held in conjunction with the Materials Handling Division the following are planned:

Machine Shop Meeting, Machine Shop Division, Newark N. J.
Textile Meeting, Textile Division, Paterson, N. J.
Pulverized Fuel Meeting, Fuel Division, Bayonne, N. J.
Machine Shop Methods, Management Division, Elizabeth, N. J.
Big Boilers, Power Division, Hoboken, N. J.
Locomotive Stokers, Railroad Division, Newark, N. J.

Boston will hold a meeting on standardizing data on year-round operation of boiler plants, one on electric waves and their application to wireless transmission, and one on the development of precision in machine-tool work.

The Cleveland Section, in addition to those already mentioned, has planned meetings on the following subjects: Die Cutting with Automatic Machine; Centrifugal Casting; and Machine Tools of Foreign Countries.

The activities of these large sections of the Society, as outlined, are typical of the character of meetings being held by engineers in both large and small industrial centers, and plans under consideration promise still more important developments. All this is written before the meetings of the standing committees on Local Sections and on Professional Divisions planned for the third week of September for the purpose of reviewing and augmenting the events scheduled so far, especially in the light of the assistance which the Professional Divisions are able to furnish the Local Sections in the matter of providing technical programs and speakers. This is an entirely new phase of the Society's activities which promises much upon development. It will undoubtedly come to be that at all the meetings of the Local Sections the professional programs will be furnished by the Professional Divisions, and these meetings, together with the Annual and Spring Meetings in which the Professional Divisions also coöperate, will provide a continuous form for the propagation of the technical work of the Society into the field of the engineering industries.

CLIPPINGS SHOW PRESS INTEREST IN ENGINEERING

(*Continued from page 113*)

tained, the circulation figure being derived from the total circulation of the newspapers that carried the story as reported by the clipping bureau. The figures obtained are conservative, as some references to Society activities doubtless escape the clipping agencies.

The clippings show that the activities of the Society have been reported in papers all over the country. The newspaper circulation outside of New York City attained by the story of the Fortieth Anniversary Meeting was over six million and in New York City about three million. Several stories relating to the 1920 Annual Meeting reached three million circulation outside of the city. The various sessions at the Spring Meeting attracted widespread attention throughout the country, that of the Management Division being especially notable, achieving eight and one-half million circulation. Accounts of Materials Handling Division session appeared in papers having a total circulation of over four and one-half million, while particulars of the excursion to Rock Island were placed in the hands of four and one-half million readers outside of New York City and over two million in the city. The recent trip of the John Fritz Medal Board of Award to France and England was reported in American newspapers having about five million circulation, as well as in a number of influential foreign journals.

All this is an indication that the popular understanding of the engineer's mission is increasing.

PROCEDURE FOLLOWED IN ADOPTION OF A.S.M.E. 19 POWER TEST CODES

Eight Steps Necessary Before Codes Are Presented for Final Discussion and Adoption

As an example of the pains that are taken to insure that Codes adopted by the Society which may become the recommended practices of the industries are acceptable in advance, an outline of the steps taken in the case of each of the individual Power Test Codes will be of interest.

It will be recalled that the organization of the Committee on Power Test Codes consists of a Main Committee with sub-committees known as individual committees, to each of which is assigned one of the test codes. There are nineteen codes in the collection and hence nineteen of these individual committees. The individual committee is the body which does the original work of formulating and editing the Code. After that these are the steps taken:

Eight Essential Steps

1 Individual Committee submits preliminary draft of test code to Secretary of Main Committee.
2 Secretary edits preliminary draft and sends copy of edited version to each member of Individual Committee.
3 Individual Committee returns edited version approved.
4 Code is set in type and distributed to selected list of engineers for criticism.
5 Individual Committee submits signed draft of Code revised in view of the comments elicited, to Main Committee.
6 Main Committee submits signed revised draft of Code to Council and asks permission to print it as a tentative code and to present it to the Society for adoption as an A.S.M.E. Code.
7 Code is printed in MECHANICAL ENGINEERING and other papers with introductory paragraph explaining that it has not yet been adopted by the Society, but will be presented at the next meeting (giving place and date) for consideration and possible adoption; that there is still an opportunity for revision, and requesting comment and criticism.
8 Code is offered for discussion and adoption at a regular meeting of the Society.

It will be noted that there are at least three opportunities for criticism by the public and that, if further public discussion is required, additional opportunity is provided by arranging public hearings at any time in the procedure outlined above.

Handling of the Boiler and Elevator Codes

The other code work of the Society such as that of the Boiler Code and the Elevator Code is handled in exactly the same way, with the exception that the Main Committee takes the place of the individual committees. In the case of the Boiler Code Committee its practice to hold periodic public hearings is well known, as is also its custom of publishing in MECHANICAL ENGINEERING the interpretations of the Boiler Code.

The point it is desired to emphasize is that in all of this work of the Society which affects the industries and the public, ample opportunity is provided for all interested to meet with the committees and to take part in the formulation of the recommendations which are likely to be adopted by the Society.

All the new members of the Society are being assigned to one or another of the Local Sections. This is found to be the quickest and most effective way of bringing the new men into contact with the organization. The first service the Society offers new members is extension of acquaintanceship in the profession.

MANAGEMENT DIVISION EXECUTIVE COMMITTEE STARTS SEASON'S WORK

Three Sub-Committees Appointed, Budget Discussed and Schedule of Meetings Announced

The organization meeting of the new Executive Committee of the Management Division for 1921–1922 was held on August 15 in the Society's rooms. At this meeting Mr. Alonzo Flack was appointed Secretary of the Division.

A second meeting was held on August 22, at which the following sub-committees of the Division were appointed:

3 Sub-Committees Appointed

Management Session Annual Meeting:
John H. Williams, *Chairman*
R. A. Wentworth
3 others to be appointed later.

The duties of this committee are to prepare a program and secure papers and speakers for the coming Annual and Spring meetings.

Assistance to Local Sections:
R. W. Scott, *Chairman*
W. H. Greul
3 others to be appointed later.

The duties of this committee are to prepare and secure a list of papers and speakers to supply the requests of Local Sections and to keep this movement before them.

Measurement of Managerial Ability:
A. L. De Leeuw, *Chairman*
L. P. Alford
3 others to be appointed later.

The duties of this committee are to devise methods of measuring managerial ability.

A third meeting was held on September 12 at which the budget covering the activities of the Management Division was discussed and several new sub-committees suggested as follows: Membership; Advisory Council of Noted Managers; International Relations; Program of Activities including relations with other societies and covering forms of management other than industrial, such as banks, stores, advertising, amusement, military, etc.; Present State of the Art, including responsibility for inventory, single or dual responsibility, banker control, stock-owning management, importance of welfare work, importance of training, etc.; Functions of Management and Wastes of Management.

Subjects for "Funtions of Management"

Several subjects were suggested to be considered as "Functions of Management" and to be used as topics for special committees, meetings or papers as may be most appropriate. These subjects might be particularly worth studying in those industries in which the subject is strongly developed, as follows:

SUBJECT	INDUSTRY
Buying for Quick Turnover	Department Store
Stores Control	Department Store
Mass Production	Ford Methods
Elimination of Hand Work	Steel or Chemical Industries
Technical Control	Chemical Industries
Scheduling or Dispatching	Railroad
Safety	Railroad
Costs	Department Store
Credits	Department Store
Advertising	Department Store
Selling	Department Store
Profits	Bank
Speed	Newspaper
Discipline	Army
Human Control	Telephone
Neatness	Navy
Courage	Construction

Adaptability	Work Millinery Manufacture
Strategy Organization	Military or Political

The tentative program for the session at the Annual Meeting was also discussed. The Management Division has been assigned two functions at the annual Meeting, one of which is to be the Keynote Session on the subject of "Elimination of Waste in Industry."

The executive Committee of the Management Division has planned the following schedule of meetings for 1921–22:

1921: Oct. 3; Nov. 7; Dec. 5.

1922: Jan. 9; Feb. 6; Mar. 6; Apr. 3; May 1; June 5; Sept. 11; Oct. 2; Nov. 6; Dec. 4.

These dates all fall on Monday and the hour set for each meeting is 3 30 p. m.

Special meetings in July and August will be called by the Chairman, if necessary.

INDUSTRIAL APPLICATION OF ENGINEERING OF INTEREST TO PROFESSIONAL DIVISIONS

Textile, Machine-Shop, Power and Materials Handling Papers Good Illustrations

The Society has devoted forty years of active work to the development of the technology of mechanical engineering—conveniently classified into the two main branches of power plant and machine shop—and has in addition in the last few years taken up intensively the phases of management. It has also of late focused attention on the industrial applications of engineering and several papers have been delivered pertaining to this field.

The last of these branches, the industrial applications of mechanical engineering, is destined to receive considerable incentive from the new organization of the Professional Divisions, and, it is significant to note to what extent already the papers before the Divisions have been developed along these lines. The Professional Divisions can be conceived as organizations in the Society to extend the technology of mechanical engineering and the knowledge and experience of mechanical engineers out into the great industries.

The Textile Division is a significant example—its papers are always on the applications of mechanical engineering to the textile industry. The Machine Shop papers, instead of discussing as heretofore the development of machine-shop practice, have begun to describe the influences of machine-shop methods and practices in the great industries—the influence of the automobile on the machine-tool industry was the topic at the last Spring Meeting.

The Power Division papers at the Annual Meeting will treat more of the economics of the power industry than of the mechanical methods of power generation. The Forest Products Division papers will discuss the importance of engineering in the forest products industry. The Materials Handling Division has been collecting a series of symposiums on the applications of Materials Handling methods in the major industries.

The foregoing examples illustrate an important trend of the Society's work, and now that the technology of mechanical engineering is fairly well established, an entirely new opportunity is presented to the Society in extending this technology into the major industries.

Circular to the Membership

On October first there was mailed to the voting membership a small circular calling attention to the proposed new constitution published in the August 1921 issue of *Mechanical Engineering* and also to a separate amendment to permit Junior members of the Society to vote on all questions. These amendments will be discussed at the forthcoming Annual Meeting.

STANDING COMMITTEE ON PROFESSIONAL DIVISIONS MEETS TO DISCUSS PLANS

Annual Report of Committee Approved and New Divisions Considered

The first meeting of the Standing Committee on Professional Divisions for the new season was held in the Society's rooms in New York on September 21. There was a good attendance and many matters of importance to the Professional Divisions were discussed.

The annual Report of the Committee, to be presented to the Council on October 10 and to the members of the Society at the Annual Meeting, was discussed in detail and approved by the Committee. The report includes chapters on meetings of the Standing Committee; registration in the Divisions; plans carried out in 1920–21; plans for the new year, including the Annual Meeting and the Spring Meeting in Atlanta, and plans in conjunction with the Local Sections; a list of the standing committees, etc. The report will be abstracted in MECHANICAL ENGINEERING later.

Other items of business at the meeting included the election of a new Chairman and Vice-Chairman for 1921–22 and the discussion of proposed new Divisions.

The Professional Divisions now enter upon their second full year and many developments of importance are anticipated. The Council at its October meeting is to receive the report of the Special Committee on Organization of Society Activities, which gives particular consideration to the relations between the Professional Divisions and the other activities of the Society, more especially the Local Sections. A joint meeting of the Committee on Professional Divisions and on Local Sections is planned for sometime in October to go over the features of this report in detail and to evolve working arrangements for the handling of papers secured by Professional Divisions, for the conduct of meetings of the Local Sections with the assistance of Professional Divisions in providing the technical programs, and for the utilization of the Professional Divisions' organization in assisting in the several major branches of the Society's work.

AERONAUTIC DIVISION DEPLORES LOSS OF ZR-2

(*Continued from page 113*)

attending the test flight of the rigid R-38 (ZR-2). It is an immeasurable loss to both nations.

Yours truly,
(Signed) JOSEPH A. STEINMETZ,
Chairman, Aeronautic Division
A.S.M.E., and President,
Aero Club of Pennsylvania.

"MR. JOSEPH A. STEINMETZ,
Chairman, Aeronautic Division, A.S.M.E., and
President, Aero Club of Pennsylvania.

Dear Sir:

On behalf of the officers and men in the United States Navy, I desire to thank you for the deep sympathy you have expressed, at the appalling catastrophe which has befallen the ZR-2(R-38). Words fail to express the great grief caused by the loss of such brave men who have sacrificed their lives in the cause of aerial progress and development.

We mourn the loss of these brave men—both British and American—who have thus died for their country.

Very sincerely yours,
(Signed) H. L. PENCE,
Commander, U. S. Navy,
Acting Naval Attaché."

THE SECRETARY'S LETTER

Carnegie Foundation Report on Training for the Profession of the Law

Upon the invitation over eight years ago of a Committee of the American Bar Association The Carnegie Foundation has made an exhaustive research into the history of the preparation of a man for the profession of the law, and the relation of the educational institutions and the associations of members of the profession with the administration of justice.

All this is of importance as bearing upon what the Secretary conceives to be one of the major objects of a professional engineering society. This document has just been issued and is for free distribution, and can be obtained by writing to the Carnegie Corporation, 522 Fifth Avenue.

Quotations from Introduction

In Dr. Pritchett's introduction he states:

> There is a widespread impression in the public mind that the members of the legal profession have not, through their organizations, contributed either to the betterment of legal education or to the improvement of the administration of justice to that extent which society has the right to expect.

May we not take the above as an example to us in a parallel relation to the public?

Dr. Pritchett then goes on to say:

> It is hoped that this volume, setting forth the history and the development of legal education in the United States, may serve at least some part in enabling the profession itself to discharge that serious and high duty to organized society which is necessary for human progress and for the preservation of civil liberty.

It is interesting to note, in this connection, that Dr. Pritchett, having directed, as President of the Foundation, an exhaustive study into the education of the profession of medicine, which is recognized as having revolutionized the practice of medicine, and also later a study of the status of engineering education, (Dr. Mann's report), he should state in the opening sentence of his introduction that:

> If organized society is to continue, the great mass of human beings who compose it must be fed and clothed and warmed and transported.

This, it will be seen, is a corroboration of what we engineers have been claiming, that our profession is one of the primary professions, and without unfriendly comparisons we may properly assume leadership, in that our profession is essential to life on earth, and that we may contribute as much if not more to the comfort and well-being of man than any other profession.

It is the impression of the writer of the report, Mr. Alfred Z. Reed, that following our second war with England and our Civil War there were "periods of original creation in legal education," and that "it requires no great effort of imagination to believe that we stand on the brink of another creative period."

If what is said is true of education, in one profession, may we not very properly think it equally true of engineering education?

Engineering Profession Not Merely Materialistic

In the report complimentary incidental reference is made to the engineering profession, and it would be well to compile the statistics of engineering education and of the profession, and see how they compare with those of law, medicine, and the ministry.

In the chapter of the report entitled Inadequate Provision for Practical Training, there is a discussion of the advantages of part-time work in a law office as an essential to a proper preparation for the practice of law, and our system of shop training in connection with an engineering education is looked upon favorably.

However, there is one sentence in this chapter to which we may seriously object. It is: "The engineer deals very largely with things."

We all must elevate the profession of engineering from the materialistic concept, and with the

introduction of the practice of the science of management as a distinct branch of professional engineering, we have elevated it to the same plane with other professions, in that we are dealing with men. Unfortunately this concept has not yet pervaded even our own ranks, as will be seen in the open letter to the professional engineers of this state, prepared by a committee, objecting to an amendment to the present law. This committee of our leading engineers said:

> Looked at in the large and in brief, with details subordinated for the purpose of emphasizing the chief characteristics, Law deals with rights, Medicine with life, Engineering with materials.[1]

We should challenge the limitation of professional engineering to dealing only "with materials."

On the walls of the Engineering Societies Library is the definition of engineering which has been accepted as the definition and concept of the profession:

> Engineering—the art of *organizing and directing men*, and of controlling the forces and materials of nature for the benefit of the human race.

The essence of this report of Mr. Reed to the Carnegie Corporation would seem to be that the standard of ethics and the plane on which the profession should work will not be obtained from working solely with materials in the shop and in the field, that the inspiration which carries one through life are those standards of life and conduct obtained in college, and a proper start in the legal profession. For the purposes of discussion, we may paraphrase for the engineering profession: The basis for education must be set in our fundamental systems of education, so that later only an advisory committee of the profession will be needed to assist members of a profession in attaining their ideals.

Calvin W. Rice, *Secretary.*

[1] Report to Professional Engineers who signed the Petition of March 21, 1921, to the Senate and Assembly of the State of New York in Support of Senate Bill, No. 716, known as the Engineers' Bill (Now Chapter 581 of the Laws of 1921), page 4.

EXPRESSION OF THANKS FROM FRENCH ENGINEERS

Since the visit of engineers from this country to France the following letter from Monsieur L. Chagnaud, president of La Société des Ingénieurs Civils de France, was received by President Carman. It is printed here in order that the expression of gratitude and good-fellowship contained therein may reach every member of the Society.

> Our society has had the great pleasure and honor of receiving, on the 8th of July last, the delegation which the four great American engineering societies appointed to tender to the French engineers, in the name of the American engineers, under the leadership of Mr. Ambrose Swasey, chairman of the delegation, their thanks and congratulations on the work accomplished during the war.
>
> In the name of our committee and of our society, I have the honor to address to you our warm and sincere thanks for the sentiments which you were kind enough to express on that occasion to the French engineers.
>
> A detailed report of this reception is being prepared and will be sent to you in due course, but without waiting further I have thought it best to inform you of this and, at the same time, to advise you that our society, considering that it is not only to its members to which this address of sympathy was directed, has decided to transmit the same also to the various engineering bodies and technical associations of France.

POWER DIVISION FILLS COMMITTEE VACANCIES

Due to the retirement of Prof. W. B. Gregory and Thomas E. Murray from the Executive Committee of the Power Division, a letter ballot of the membership of the Division has been taken and the vacancies have been filled by the election of C. H. Berry and John H. Lawrence, with Ervin G. Bailey as alternate. These new men with A. D. Bailey, A. G. Christie and L. S. Marks now constitute the Executive Committee for 1921–22.

THE ABERDEEN MEETING

Arrangements are complete for the joint meeting of the Society of Automotive Engineers, the Army Ordnance Association and the Ordnance Division of this Society to be held at the Aberdeen Proving Grounds on October 7. General information about this meeting was published in the September issue of Mechanical Engineering and in circular form by the S.A.E. and A.S.M.E. An account of the meeting will appear in the November issue of Mechanical Engineering.

W. H. RASTALL TO STUDY WORLD MACHINERY MARKET

Walter H. Rastall, a member of our Society and mechanical engineer and marine draftsman of Dayton, Ohio, has been appointed chief of the heavy machinery division of the Department of Commerce which was recently created under the export industries act. This division will give particular attention to the problems connected with the marketing of American machinery throughout the world.

Mr. Rastall studied civil, electrical, and mechanical engineering and naval architecture at the University of Maine and Cornell University. From 1904 to 1911 he was resident engineer for the American Trading Company at Kobe, Japan, then sales engineer for the Worthington Pump & Machinery Corporation for four years. He recently completed an investigation of the markets for industrial machinery in the Far East.

Recent Section Meetings

Detroit. September 16. In the Auditorium of the Board of Commerce. Joint meeting with other technical societies of Detroit. Mr. John C. Parker addressed this meeting on the aims and purposes of the proposed affiliations of technical societies in Detroit.

Metropolitan. September 23. Subject: Snow-Removal Problem.

Necrology[1]

James Keith, managing director of James Keith & Blackman Co., Ltd., London, died on February 23, 1921. Mr. Keith was born in Arbroath, Scotland, in February 1849. He was educated in the Arbroath schools and later served an apprenticeship with his father. In 1868 he established a business of his own as a specialist in heating, ventilating, etc. In 1900 his business was amalgamated with that of the Blackman Ventilating Co., Ltd. and he became managing director of the combined concerns. He was an associate member of the Institution of Civil Engineers, a member of the Institution of Mechanical Engineers, the Institution of Marine Engineers and the Royal Institution of Great Britain. He was director and vice-president of the Institute of Industry of Great Britian. He became a member of our Society in 1916.

Jack Stanley Herbert, assistant superintendent of the Gautier Department of the Cambria Steel Co., Johnstown, Pa., died on February 24, 1921. Mr. Herbert was born in Newcastle, Wyo., on March 13, 1881. He was educated at West Point Military Academy and the Massachusetts Institute of Technology. He was associated with the following firms at different periods of his work: Pennsylvania Portland Cement Co., engineer of maintenance and construction, Atlantic & Gulf Portland Cement Co., chief engineer, W. B. Shaffer Engineering Co., chief engineer. In 1913 he was appointed superintendent of safety for the Cambria Steel Co., and in 1917 became assistant superintendent of the Gautier Department. He became a member of the Society in 1908.

George M. Davis, Locomotive designer, Norfolk & Western Railway Co., Roanoke, Va., died on May 17, 1921. Mr. Davis was born in June 1880 in Moorefield, W. Va. He was graduated from the N. C. State College of Agriculture and Engineering in 1901 with the degree of B.E. He was formerly connected with W. E. Martin, Winston-Salem, N. C. the Salem Iron Works and the Winston-Salem Southbound Railway Co. In 1911 he became associated with the Norfolk & Western where he was employed at the time of his death. He became a member of the Society in 1918.

[1] For details of the professional careers of deceased members, see necrology section of the Transactions of the Society, Volume 43.

Coming Section Meetings

Chicago. October. Subject: Power.

Colorado. October 28. At the Metropole Hotel, Denver, Colorado. Subject: History and Products of the Leyner Engineering Works, by H. Levine, Leyner Engineering Co.

Columbus. October 21. At the Southern Hotel. Joint meeting of A.S.M.E. local section with the Engineers Club, A.S.C.E. and A.A.E., to be in charge of the A.S.M.E. Local Section.

Connecticut State.
Waterbury. October 1. Outing at "Stone House," Shepaug, Conn. Visit to the New Reservoir, Shepaug Water-shed. Speaker Robert A. Cairns, Engineer.

Metropolitan. (*N.Y.C.*) October 19. Subject: Engineering Financing. Joint meeting with A.I.E.E. and A.S.C.E. in Engineering Societies Building.
October 28. Subject: Machine Shop Meeting, in Newark, N. J.

Mid-Continent. Weekly luncheons at Tea Cup Inn, Tulsa, Okla., every Friday noon.

Philadelphia. October 25. Public Utility Night. Arrangements to be made by Mr. W. C. L. Eglin.

San Francisco. Weekly luncheons at the Engineers' Club, every Thursday noon.

EMPLOYMENT SERVICE BULLETIN

Conducted by the Employment Service of The Federated American Engineering Societies,
29 West 39th St., New York

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

SALES MANAGER thoroughly conversant with sales methods on mechanical products; must be familiar with die and punch work. Location New Jersey. X-857.

COMPETENT STEAM HEATING AND VENTILATING ENGINEER with broad experience and capable of handling layouts and specifications for all types of buildings, including residences, factories, churches, theatres and schools. Applicant should know building construction and be able to develop heating and ventilating plans in conjunction with architect. Location vicinity Philadelphia. Give full particulars regarding education and experience. X-901.

SALES ENGINEER experienced in belting. Must have sales experience and speak Spanish fluently. X-907.

ENGINEERS to take up sales work. Experience in selling unnecessary. Location New York. X-909.

SALESMAN for heavy farm machinery and contractor's power. Both office and road work, particularly the establishing of live sales agencies throughout East and South. Salary with bonus for new business developed. Real opportunity for energetic man who can produce results. Write fully as to previous experience, and give references. X-919.

ASSISTANT SALES MANAGER for inside work with experience in heating and ventilation—both from design and installation standpoint; outside and inside sales work; sales promotion and correspondence. Location New York City. X-925.

TECHNICAL GRADUATE thoroughly conversant in machine designing and developing. Do not want tracer, detailer or ordinary draftsman. Want good machine designer, with necessary theoretical trainingand experience so that he can tackle problems of designing and improving machinery and quickly place his ideas on paper. Work of designing will be for manufacture of wires and cables from unfinished wire bars up to final finished product. Location New Jersey. X-934.

ENERGETIC SALESMAN, with some knowledge of combustion, to solicit business for sale of guaranteed combustion efficiency device with service, applicable to all low-pressure heating plants. Commission basis, with drawing account against commissions. Devices and service guaranteed to increase efficiency 25% or decrease coal consumption equal amount. Is used and endorsed by officers and leading members of Greater New York Taxpayers' Association (Controlling over five thousand apartments), other real estate associations and hundreds of apartments and other property owners in Greater New York. Excellent opportunity for aggressive salesman. X-948.

MAN OF WIDE EXPERIENCE on automatic paper mill or paper-finishing machinery. Only men with this experience considered. Location New York. X-956.

MECHANICAL ENGINEER to supervise construction of automobile and marine engines from 10 hp. to 10,000 hp. Investment necessary. Location New York City. X-963.

SALES ENGINEER with experience in air-washing installations for turbo-generator plants. Should have good technical training, preferably several years' designing and selling experience in air-washer line. After sufficient trial period, and proving capable and reliable, count on promotion to position of assistant sales manager. X-964.

ENGINEER experienced in handling help and in maintenance work in machine-shop and foundry, also power-house equipment; fairly good technical education. Position is assistant to mechanical engineer with good future for one willing to work. Prefer man with malleable-iron experience with home in Middle West. X-972.

SALESMAN. Exclusive sales privileges granted in territory comprising one or more states depending upon ability. State previous experience and territory desired. X-974.

LUBRICATING ENGINEER wanted by large corporation for the Philippine Islands. Young, unmarried man. Must speak Spanish. X-975.

HIGH-CLASS SALESMEN to sell valves and boiler trimmings. This experience necessary. One for New York and one as resident salesman in Philadelphia. Ready November 1 or sooner. X-981.

MECHANICAL ENGINEER, well known among engineers, architects, and contractors of New York City and vicinity to sell insulation material for manufacturing company well known in its field and well established. X-989.

HEATING AND VENTILATING DRAFTSMAN. Must be able to make complete layout without assistance. Location New York City. X-982.

COMPETENT ENGINEER & PRODUCTION MAN, capable of handling daily output of 100 or more cars. Have 100 established county agencies with six thousand cars sold under contract. Would like applicant to become interested in stock of company, either personally or through friends. Building standard air-cooled four-cycle Roadster at $395; five pass, about $500. X-984.

RECENT GRADUATE ENGINEER desired by large hardwood veneer plant in Middle West. Must be familiar with steam and electrical equipment and capable of handling machine design. Executive ability essential. Location two years hence, Louisiana. X-985.

SALESMAN to sell service of dental organization to dentists. Experience unnecessary. Location New York City. X-986.

YOUNG MEN of good address who have mechanical training, to sell course in use of the Manheim Slide Rule, consisting of twelve printed lectures. X-994.

ENGINEERS with sales experience, and knowledge of power plant equipment, heating and ventilating apparatus. Compensation, for the present, straight liberal commission basis, giving men exclusive territory and furnishing plenty of leads. Location of main office in Newark, N. J., and territory to be handled at this time includes Essex, Hudson, and Union Counties. X-1007.

MEN AVAILABLE

The large number of requests to insert notices under this heading makes it necessary hereafter to limit the number of words in each notice to 20 so that as many members as possible may be accommodated.

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter; unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

EXECUTIVE, practical mechanic; mechanical engineer; age 38; first-class references; 20 years' experience; now manager of corporation, desires a change. SM-6717.

STEAM ENGINEER, technical graduate, wants position as boiler-plant foreman; 8 years' experience in operation and maintenance of modern boiler plants. Age 30 years. Married. SM-6718.

WORKS MANAGER, 20 years' experience manufacturing and production methods; shoe machinery, cotton machinery, adding machinery, etc. Present salary $5000. SM-6719.

ELEVATOR ENGINEER, 12 years' experience in design, production, construction and sales. Desires position as district manager. Location in States immaterial. SM-6720.

MECHANICAL ENGINEER, graduate M.I.T. age 33, married; 9 years' general engineering; desires position assistant to executive or as chief draftsman. SM-6721.

FUEL OIL ENGINEER, technical graduate; age 20; research, design, installation fuel-oil systems. Design, construction furnaces, core ovens. Aluminum foundry, smelter experience. Available immediately. SM-6722.

GRADUATE ENGINEER, M.E. degree; 6 years' teaching experience. Desirous of entering heating ventilating concern. Broad technical experience in same. SM-6723.

PETROLEUM ENGINEER, M.E. Age 33. Broad experience in production and pipe-line work, desires position with large oil company. SM-6724.

ELECTRICAL-MECHANICAL ENGINEER, technical graduate, 5 years' experience plant maintenance, construction. Has held responsible positions in large plants. SM-6725.

DESIGNER with experience on special machinery, tools, dies and equipment for quantity production. Location Indiana. SM-6726.

ENGINEER, 43, college graduate, 20 years' experience leading steel works; 3 as chief draughtsman, 5 as chief engineer, also in field, erecting. SM-6727.

REFRIGERATING ENGINEER, University graduate; 7 years' experience in insulation and refrigeration work. Preference sales department. Available October 1. SM-6728.

ENGINEER AND EXECUTIVE, 16 years' experience, design, sales, production, research, advertising; now assistant manager steel-plate production. Desires permanent change. SM-6729.

ASSISTANT TO EXECUTIVE, CHIEF ENGINEER OR SALES, Harvard graduate, 10 years' experience, hoisting, conveying, coal-handling and power-transmission apparatus. Capable engineer and executive. SM-6730.

WORKS MANAGER or SUPERINTENDENT, Technical training with practical shop experience, thorough knowledge of modern production methods and costs. SM-6731.

MECHANICAL ENGINEER-DRAFTSMAN, B.S., Mech. E., M.A. Columbia graduate 1906; 15 years' experience in power-plant and ship engineering and drafting, handling of men and materials. SM-6732.

FACTORY EXECUTIVE, mechanical and steam Engineer; 18 years, cast brass and iron product. Executive in foundry, pattern, tooling, production and office experience. SM-6733.

MECHANICAL ENGINEER, recently general manager large mining and smelting company South America desires connection with similar concern in U. S., West or Southwest preferred, or with company manufacturing mining and smelting machinery; 25 years' experience design, manufacture and operation of mining and smelting machinery. Qualified to take charge of any class of metal mine and reduction works. SM-6734.

GAS ENGINEER, young man, technical training; experienced in gas manufacture and high and low pressure distribution. Now employed getting efficient results but limited future. SM-6735.

WORKS MANAGER, 38, member, graduate M.E., 18 years' engineering and executive experience. Specialist in organization, production control, plant layout, incentives and standards. SM-6736.

MECHANICAL ENGINEER desires permanent position with sales department. Excellent European connections; familiarity with trade conditions. SM-6737.

MACHINE-SHOP EXECUTIVE, age 38; 22 years' practical experience, general foreman, assistant superintendent, or superintendent, any line anywhere, excellent references. Now employed. SM-6738.

MECHANICAL ENGINEER, technical graduate; 9 years' teaching experience high schools, 4 years practical. Executive position desired. East preferred. SM-6739.

SALES ENGINEER and CORRESPONDENT, M.E., age 28, single. Six years' experience in engineering and salesmanship with excellent record. References. Smaller corporation preferred. Location immaterial. SM-6740.

TOOL or PRODUCTION ENGINEER, 41, broad experience, designing, planning and building auto-

matics and tools for automotive and small parts. Greater New York. SM-6741.

MECHANICAL ENGINEER, Cornell. Eight years' experience chemical and metallurgical lines, on plant design, construction, maintenance, operation, sales, purchasing. Executive work. Available soon. SM-6742.

EXECUTIVE ENGINEER, graduate. 8 years' production, planning, costs, inspection, organization, employment, time-study stores. Newark or Metropolitan district preferred. SM-6743.

EXPORT ENGINEER residing in Far East, conversant with foreign exchange, accounting, costs, taxes, contracts, shipping and financing of sales. Speaks French, German, Spanish and Mandarin-Chinese. M.E., age 29, American, married. SM-6744.

GRADUATE ENGINEER, believing in industrial training to increase production and lower costs, would like to negotiate with manufacturer interested in this subject. SM-6745.

ENGINEER, assistant to executive. Young, with unusual ability. Experienced in forge work and plant maintenance. Excellent references. Write for details. SM-6746.

ENGINEER, 16 years' experience design and manufacture d.c. and a.c. motors to 100 hp. Have developed special motors for application various classes apparatus. Appreciate simplicity of mechanical design in relation manufacturing costs. Considerable executive and sales experience. SM-6747.

ENGINEER EXECUTIVE, 28, technical graduate, 5 years' woodworking experience includes maintenance, power, dry kilns, plywood and standardization of production and methods. SM-6748.

MECHANICAL and PRODUCTION ENGINEER on interchangeable parts, 20 years' experience manufacturing clocks, watches and electrical instruments. Highest references. SM-6749.

ENGINEER, mechanical or sales; 4 years' shop experience; 8 years' heating and ventilating engineering, machine and jigs and fixture design. Location optional, salary commensurate. SM-6750.

SUPERINTENDENT of power-plant construction and operation. Executive position experience. Technical graduate, age 26, married. Author of technical articles. SM-6751.

GRADUATE MECHANICAL ENGINEER, age 26; experience in drafting, automobiles, and telephone switch boards. Interested in production and sales work. Available three weeks' notice. SM-6752.

MECHANICAL ENGINEER in capacity of boiler-shop superintendent open for engagement. First-class executive and producer; familiar with fire, watertube and Scotch marine types. Best of references. SM-6753.

CONSULTING ENGINEER, age 35, American, broad experience factory construction and operation, power-plant engineering, construction and development of industrial projects, is open to proposition. Competent executive. Has small but select clientele. SM-6754.

MECHANICAL ENGINEER, graduate, age 33. Executive, development and maintenance industrial and chemical plants, acids, coal-tar products, artificial silk and electrolytic chlorine. Eastern or middle west location. SM-6755.

DESIGNING ENGINEER, age 31, 13 years' wide experience mechanical and industrial-engineering design, layout calculation and investigation. Executive and business ability. Executive, board or sales position; location immaterial. SM-6756.

SALES ENGINEER, age 27; mechanical engineer; 7 years' designing and selling experience heating, ventilation, power plant. Desires to connect with progressive firm of engineering equipment. SM-6757.

MECHANICAL ENGINEER; 8 years as mechanical executive in rubber mills; competent to design or supervise design and assume charge of executive end. SM-6758.

MECHANICAL ENGINEER, draftsman; 28; Pennsylvania State; married; power-plant design; piping supervising installation; detailing; checking; estimating; specification writing; steel and reinforced concrete. SM-6759.

EXECUTIVE, experienced in development of machines and tools for rapid production; possessing initiative and tact in machine shop supervision. SM-6760.

DESIGNING ENGINEER, 7 years' experience designing and installing glass machinery, desires position; any location. Age 35, married. American. SM-6761.

ENGINEER, graduate M.E.; 10 years' experience production, inspection, designer, chief draftsman, etc. desires permanent connection, mill work, automotive, engine design or similar work. SM-6762.

PLANT and CONSTRUCTION ENGINEER, technical graduate; 33; 5 years' electrical-power construction, 4 years' mechanical and general plant construction; 2 years' steam-plant testing and operating. SM-6763.

WOODWORKING ENGINEER, technical graduate; 5 years' experience production, time study, betterment, maintenance, power, plywood, dry kilns, as chief engineer and superintendent. SM-6764.

EXECUTIVE and ENGINEER age 38, offers character, personality, ability, broad varied executive experience, for major executive responsibility carrying worthy initial and future compensation. SM-6765.

ENGINEER, mechanical, assistant, 30, technical graduate; 11 years' experience on machinery and machine tools. Position desired assistant to works manager in New York City. SM-6766.

ENGINEER familiar with steam, Diesel and semi-Diesel engines, also boilers; desires to connect with sales department of progressive concern. SM-6767.

POWER SUPERINTENDENT. Can get results. Present salary $4000. Bigger job more attractive than increase in salary. SM-6768.

DESIGNER, age 32; 8 ½ years' experience draftsman, designer and chief draftsman in drafting room for manufacturer of hand-elevating and electric-elevating trucks and tractors. SM-6769.

EXECUTIVE, mechanical Engineer. 38, married. Exceptional experience and ability. Can operate foundry and wood-working plant. Very successful with help. Have held positions of Supt., Genl. Supt., Genl. Mgr., Production and works Mgr. consulting and industrial Engineer. SM-6770.

MECHANICAL ENGINEER 28, Columbia, with 6 years' general experience, familiary with all phases of central-station work, available for operating or commercial department of electrical utility company. SM-6771.

MECHANICAL ENGINEER, technical graduate, age 34; 10 years' operation and maintenance of factory and steel-plant equipment; 2 years' managing shop manufacturing interchangeable parts. SM-6772.

DESIGNING ENGINEER, 18 years' experience, good executive, automactic machinery, general engineering, inventive. Salary $3000. SM-6773.

SALES ENGINEER with 6 years' successful experience wants permanent connection with well-established manufacturer; American, age 30, married, mechanical graduate. SM-6774.

CONSULTING ENGINEER wishes connection with New York engineering office. Specialized in construction work, reports, appraisals for oil and gas industry. SM-6775.

DESIGNING ENGINEER, 18 years' experience, bridge shop, steel-mill maintenance, machinery, bridge and structural steel, by-product coke-oven apparatus, steam-power plants, etc. Reasonable salary. SM-6776.

MECHANICAL ENGINEER. Stevens, 1920, will be glad to consider any good opportunity. Any location, preferably New England. SM-6777.

SAFETY and FIRE-PROTECTION ENGINEER, 10 years' engineering field and office experience. Executive of analytical mind, desires change. Assistant managership reputable concern preferred. Location, New York City. Salary $3600. Married. SM-6778.

MECHANICAL ENGINEER, M.I.T. graduate, age 31; heating, ventilating, power-piping and power-house design and construction; employed now chief inspector. SM-6779.

WORKS MANAGER with wide experience in manufacturing machine tools, automobiles and other productions requiring interchangeable parts. SM-6780.

PLANT ENGINEER or POWER-PLANT DESIGNER, age 43. Wide experience in factory, power-plant and construction engineering. SM-6781.

SUPERVISING ENGINEER and SUPERINTENDENT, broad-gage man, 20 years' varied experience, successful coördinator of men, materials, equipments and methods. SM-7682.

TRUCK ENGINEER age 40, technical education; 18 years' experience design, production and maintenance motor vehicles. Desires executive position with truck manufacturer or corporation operating large fleet of trucks. SM-6783.

MECHANICAL and ELECTRICAL experience in design, development, and sales work. Technical education and nine years' practice. Location, New York. SM-6784.

INDUSTRIAL ENGINEER, technical graduate, twelve years' manufacturing experience, operating and executive—forge, foundry, machine-shop. Desires new connection. Pittsburgh or vicinity preferred. SM-6785.

MECHANICAL ENGINEER, Columbia, 7 years' experience designing power piping. Desires position in New York. Age 31; unmarried. SM-6786.

MECHANICAL ENGINEER, age 24, technical graduate. Two years with the General Electric Company as student electrical engineer. Location immaterial. SM-6787.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER OCTOBER 29, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically by states, then alphabetically.

Unless objection is made to any of the candidates by Oct. 29, 1921 and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the council.

NEW APPLICATIONS

Alabama

BEST, EDWIN J., Chief Engineer, Woodward Iron Co., Woodward

California

BARKER, TOM, Vice-President and General Manager, Insulation Engineering Co. San Francisco
NEWBY, ARTHUR B., Los Angeles
SMITH, HARRY J., Engineer, Pacific Gas & Electric Co., San Francisco
SWIFT, CHARLES, JR., Pacific Gas & Electric Co., Sacramento

Colorado

GALLENKAMP, EDWARD W., JR., President and Manager, York Mid-West Ice Machine Co., Denver

Connecticut

EMERSON, CARL, President, Thomas A. Stewart Co., Hartford
SCARBOROUGH, LAWRENCE D., Boiler Inspector, Hartford Steam Boiler Inspection & Insurance Co., Hartford

District of Columbia

ABADIE, EUGENE H., Consulting Engineer, Washington
BIELEFELDT, WILLIAM A., Assistant to Chief, Gage Section, Manufacturing Service, Washington
MITCHELL, ALBERT F., Engineer Tank, Tractor & Trailer Division, Ordnance Department, United States Army, Washington
TRANSOM, FREDERICK, Examiner, United States Patent Office, Washington

Florida

KIPLINGER, CLARENCE G., St. Petersburg

Georgia

ABRAMS, V. R., Engineer of Gas, The Atlantic Refining Co., Brunswick
McMURRY, JESS A., Steam Specialist, Crane Co., Atlanta

Illinois

GENTINE, HOWARD I., Chief Engineer, American Atomized Fuel Co., Shelbyville
KNIGHT, ARTHUR W., Division Manager, Celite Products Co., Chicago
KOPLE MONTE, Chicago
MELLEN, GEORGE F., Dispatcher, Automatic Electric Co., Chicago

SCHRADER, WILLIAM A., Sales Engineer, Leader Iron Works, Decatur
WRIGHT, ABBOTT L., Assistant Mechanical Engineer, Sanitary District of Chicago, Chicago

Indiana

BERGER, EDGAR M., Inland Steel Co., Indiana Harbor
GALLOWAY, ROBERT M., Chief Engineer, National Automatic Tool Co., Richmond

Maine

ESTES, GEORGE H., Superindent, Continental Mills, Lewiston

Maryland

JOHNSON, ALLEN J., Surveyman, Engineering Department, United States Army, Chesapeake City
WALDEN, ROBERT R., Watch Engineer, Gas-Electric Booster Station, Baltimore County Water & Electric Co., Baltimore

Massachusetts

BARTLETT, GAD R., Engineer, Boston Elevated Railway Co., Boston
CAVERNO, CHARLES B., Master Mechanic, H. P. Hood & Sons, Charlestown
CROCKER, PERCIVAL B., Foxboro
DONNELLY, RICHARD E., Student, Massachusetts Institute of Technology, Cambridge
ELMER, LLOYD A., Student, Massachusetts Institute of Technology, Cambridge
MORELAND, EDWARD L., Partner & Manager, Jackson & Moreland, Boston
MORGAN, RALPH L., Greenfield Tap & Die Corpn., (Reinstatement) Greenfield
NORTON, JEROME B., Supervising Engineer, Turbine Training, United States Shipping Board, Boston
SEAMPOS, STEPHEN J., Dorchester

Michigan

BURGER, MORRIS, Mechanical Engineer, Scisorek & Malkin, Detroit
HAYDEN, GEORGE D., Designing Engineer, National Twist Drill & Tool Co., Detroit
KINNUCAN, JAMES W., Detroit
NUTTALL, FRED, Master Mechanic, Quincy Mining Co., Hancock
ROBINSON, HAROLD C., Champion Ignition Co., Flint

Missouri

LOWRY, WILLIAM M., Henrici-Lowry Engineering Co., Kansas City
PECK, THEODORE A., Consulting Engineer, Lubrite Refining Co., St. Louis
SPANNAGEL, NOEL, Cupples Station, Light, Heat & Power Co., St. Louis

Nebraska

LATIMER, BERTRAND J., Superintendent, Nebraska Cement Co., Superior
PETERSON, THORWALD B., Mechanical Engineer, L. C. Sharp Manufacturing Co., Plattsmouth

New Jersey

BUCHANAN, JAFFREY P., Chief Engineer, Disc Re-Creation Division, Thomas A. Edison, Inc., Orange
BUCKNAM, JAMES E., Davis-Bournonville Co., Jersey City
CAVERLY, ORREN G., Manager, The Singer Manufacturing Co., Elizabeth
DUNNING, PARKER, General Electric Co., Bloomfield
FIRTH, R. VAN DYKE, Draftsman & Designer, Ingersoll-Rand Co., Phillipsburg
GRATRIX, CHARLES E., Cost Estimating, Taylor-Wharton Iron and Steel Co., High Bridge
NOHSE, WILLIAM R. E., Mechanical Draftsman, Central Railroad Co. of New Jersey, Elizabethport

New York

BAILEY, ROBERT O., Designer, Ford Instrument Co., New York
BARTLETT, JOHN H., JR., Foreign Representative, Surface Combustion Co., Bronx
BODKIN, MORRIS A., Proprietor & General Manager, Appraisal Engineering Co., New York
CLEARY, WALTER D., Sales Engineer, De Laval Separator Co., New York
CLINEDINST, WENDEL W., Pawling
COOPER, FRANK P., Inspector, Western Electric Co., New York
CROWLEY, GEORGE B., New York
DORAN, WALTER A., Turbine Engineer, United States Shipping Board, New York
FISHKIND, HENRY H., Vice-President, Millsco Agency, Inc., New York
GARRARD, GUY, Manufacturing Expert, Yarn Division, Frederick Vistor & Achelis, New York
GOESELE, GUSTAVE A., Mechanical Engineer, Niles, Bement, Pond Co., New York
HINCHEY, FREDERICK C., Statistical Clerk, D. & H. Co., Albany
KELLY, JOHN F., Assistant General Manager, Federal Signal Co., Albany
KOHLER, L. FRANK, Railway Engineer, Transit Commission, New York
MANSFIELD, DANIEL E., Engineer in charge General Laboratories, United States Rubber Co., New York
MOSS, SIDNEY WILLIAM, Sales Engineer, De Laval Separator Co., New York
MURPHY, JAMES E. A., New York Central Railroad Co., New York
RUHF, HAROLD J., Field Executive, James W. Elliott's Business Builders, New York
SOMBORN, CHARLES A., Brooklyn
WAGNER, JACKSON J., Brooklyn
WEILL, MELVILLE K., Vice-President & General Manager, Beech-Nut Foil Co., Brooklyn
WOLPERT, NATHAN N., National Board of Fire Underwriters, New York

North Dakota

UMBEHOCKER, FRANK, Efficiency Engineer, Red River Power Co., Grand Forks

Ohio

JACKSON, CHARLES A., Chief Operating Engineer, Hooven, Owens, Retschler Co., Hamilton

Oklahoma

MUSSON, HARRY E., Half Owner, Musson & Goyce, Oklahoma City

Pennsylvania

BROWN, WISER, Assistant Chief Engineer, Harrisburg Foundry & Machine Works, Harrisburg
COLVILLE, KENNETH H., Assistant Secretary and Engineer, Hendrick Manufacturing Co., Carbondale
EHLINGER, LOUIS J., Assistant Chief Engineer, Alan Wood Iron and Steel Co., Conshohocken
JEFFERSON, CARL J., Senior Engineer, Emergency Fleet Corpn., Philadelphia
JOHNSON, LEONARD T., Mechanical & Electrical Engineer, W. J. Rainey, Inc., Uniontown
KENT, RUSSELL H., Engineering Executive, The Kent Manufacturing Co., Clifton Heights
KING, T. H., Sales Manager, Landis Tool Co., Waynesboro
LAUSSUCQ, HARRY P. L., Hydraulic Engineer, Birdsboro Steel Foundry & Machine Co., Birdsboro
MARTIN, STANTON C., Designer, Draftsman, Erie City Iron Works, Erie
MURRAY, H. D., Grove City
RICHERS, GEORGE J., Master Mechanic, Middle Division, Pennsylvania Railroad, Altoona
ROTH, PAUL V., Shop Engineer, Leeds & Northrup Co., Philadelphia
WOLFRAM, FREDERICK H., Plant Engineer, Bonney Forge & Tool Works, Allentown

Rhode Island

MILLER, RICHARD O., Foreman, National Collapsible Tube Co., Providence

Tennessee

MORRIS, JOEL A., Mechanical Engineer, Dempster Steam Car Co., Knoxville

Washington

SECKENDORFF, ERNEST W., Estimator, Draper Engine Works, Seattle

West Virginia

RANSON, GEORGE A., Designing Draftsman, U. S. Coal & Coke Co., Gary
STORK, ALFRED H., Chief Engineer, The Charles Ward Engineering Works, Charlestown

Wisconsin

DIMICK, HORACE G., Manager & Chief Engineer, O'Keefe-Orbison Engineering & Construction Co., Appleton
MENSINGER, GEORGE, Valley Iron Works Co., Appleton

Canada

NYSTROM, KARL F., St. Lambert, Quebec
SEATON, ARTHUR H., Chief Draughtsman & Estimator, British Columbia Marine Ship Builder & Engineer, Vancouver, British Columbia

China

HOU, TE PANG, Chief Engineer, Yung Lee Soda Co., Tienstin

Denmark

CLAUSEN, HALFDAN, Engineer Lieutenant, Royal Danish Navy

India

DEATHERAGE, GEORGE E., Superintending Engineer, Hirapur Works, Indian Iron and Steel Co., Asansol, Bengal

Spain

TATE, NEWMAN, Chief Construction Designer & Assistant Engineer, Rio Tinto Mines, Huelva

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE-MEMBER

California

IRELAND, THOMAS W., Superintending Engineer, Great Western Power Co., San Francisco

Connecticut

PAINE, WALTER S., Research Engineer, Bureau of Inspection & Accident Prevention, Aetna Life Insurance Co., Hartford

Iowa

BACKER, ELMER F., Mechanical Engineer, Davenport Locomotive Works, Davenport

Minnesota

BURDICK, GEORGE S., Manager, Minneapolis Branch, Allis-Chalmers Manufacturing Co., Minneapolis

Missouri

AZBE, VICTOR J., Consulting Engineer, St. Louis

New York

HOWARD, A. E., President, H. M. Engineering Co., Grand Gorge

Pennsylvania

HATMAN, JULIUS G., Production Engineer, Barrett Co., Frankford, Philadelphia
KEATING, THOMAS E., General Engineer, Westinghouse Electric & Manufacturing Co., East Pittsburgh

Wisconsin

BERGGREN, AXEL E., Assistant Professor of Steam and Gas Engineering, University of Wisconsin, Madison
CONSOLIVER, EARL L., Vice-President & General Manager, School of Automotive Electricity, Inc., Milwaukee

PROMOTION FROM JUNIOR

Massachusetts

MOULTON, ROBERT, Assistant Secretary-Treasurer, National Fire Protection Assn., Boston

New Hampshire

NEWTON, WILBUR F., Marine Draftsman & Designer, Portsmouth Navy Yard

New Jersey

LINKER, JOHN I., Marine Engine & Piping Draftsman, New York Shipbuilding Corpn., Camden

New York

SEARLE, RUSSELL M., Designer, Ford Instrument Co., New York
VAN VOORHIS, FREDERICK S., Mechanical Engineer, Diamond Mills Paper Co., Saugerties

Washington

KNERR, LEWIS E., Mechanical Engineer, Seattle

Wisconsin

JOHN, EDWARD T., Chief Engineer, Curtis & Yale Co., Wausau

SUMMARY

New Applications	103
CHANGE OF GRADING:	
Promotion from Associate-Member	10
Promotion from Junior	7
Total	120

Herbert Hoover—Secretary of Commerce—Says:

"The waste in our production is due to the failure to secure maximum production, to lack of standardization, to inefficient equipment, and to mismanagement."

Production must be more economical. Production today depends on efficient factory management. Production is calling for men who understand the control and operation of men—methods—material—and equipment.

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Industry pays big money to men who have been trained in Factory Management. Industry has recognized the training given by the Industrial Extension Institute and has substantially rewarded men who have had this training.

Men who have completed the Factory Management Course can tell you what it has actually done for them. Read these extracts taken from typical letters:

1 **"The Factory Management Course & Service has been a great help in advancing my position. I started with my present employers Sept. 13, 1917, as a timekeeper, on November 18, 1917, became Chief Dispatcher, on March 18, 1918, Assistant Superintendent, and on February 3, 1919, Superintendent with a salary increase of 200%. I cannot help but feel indebted to you and your most efficient staff."**

2 **"It may interest you to know that my salary is now four times what it was at the time of my enrollment. The training which I have received through the Factory Management Course Service has been of material assistance to me in the progress I have made."**

Enrolled 1918. Salary $3,000 per annum. TODAY, Salary, $12,000.

3 **"The Factory Management Course and Service has greatly assisted me. Although I was 40 years old when I enrolled I have made up for lost time."**

Enrolled 1917, Salary $3,000. Salary 1918, $4,200. Salary, 1919, $6,000. Salary 1920, $9,000. Salary TODAY, $13,000.

4 **"The Factory Management Course and Service has enabled me to accept the position of General Manager with this concern."**

The names of these men will be gladly given to you if you are interested in investigating further.

The Industrial Extension Institute offers to you the "Factory Management Course Service." An "organized" course of reading and study prepared by sixty of America's leading industrial specialists. Men like Gant—Knoeppel—Steinmetz—Myers—Ficker—Roe—Babson—Payne—Farnham, have put into the course their combined brains and experience

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Mech. Engrg. Oct., 1921

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In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers. Publication Office 207 Church St., Easton, Pa. Headquarters of the Society, 29 West 39th St., New York

Vol. 43, No. 11 — A.S.M.E. AFFAIRS — November, 1921

OVER SEVEN HUNDRED ENGINEERS GUESTS OF ORDNANCE DEPARTMENT AT ABERDEEN

Inspecting Party Included Members of Army Ordnance Association, S.A.E. and A.S.M.E.—Gathering a Success as Stimulant of Interest in Ordnance Design and Construction

Over seven hundred engineers were guests of the Ordnance Department, U. S. Army, at Aberdeen Proving Ground, Aberdeen, Md., on October 7, for the purpose of observing the new 16-in. seacoast gun mounts and other interesting and recent developments in ordnance. The visitors were members of the Army Ordnance Association, the Society of Automotive Engineers, and The American Society of Mechanical Engineers. From New York, 125 A.S.M.E. members filled a special train of sleepers, one group of S.A.E. had a special car on the regular night train, and another group rode in a patented easy-riding motor bus all the way. Regular trains and automobiles brought the remainder of the inspecting party, which enjoyed itself to the utmost in following out the program which was carefully planned, thoroughly organized, and admirably conducted by Col. H. W. Schull, commanding officer, and his staff. The weather was exceedingly fine and so complete were the other arrangements that the visitors were inclined to credit the commanding officer and his staff for this added perfection.

The high points of the inspection were the two 16-in. seacoast guns, one mounted on a disappearing carriage and the other on a barbette carriage. At maximum range, these two guns toss a 2430-lb. projectile 44,000 yd. and 55,000 yd., respectively. Needless to say, their operation and details of design were studied carefully by the entire party. The 12-in. mortar and the 12-in. gun mounted on railway cars also proved of considerable interest.

The dirigible, the airplanes, the bombs, and the bomb-dropping drew the attention of all. Three demolition-type bombs were dropped, two 600-lb. and one 2000-lb. Wind conditions did not permit the scheduled dropping of the 4000-lb. bomb. The 2000-lb. bomb furnished an adequate thrill, however. As the big bombing plane circled over the crowd and headed into the wind, every eye was alert and every breath was stilled. The tense silence was relieved only in the chorus of "There it goes" as the bomb left the plane to bury itself in the ground and hurl a column of dirt, rocks and smoke high in the air.

The novelties in the mobile artillery materiel consisted of some American sisters to the French "soixante quinze." These American guns give nearly double the range of the French gun with the same weight of gun and carriage. Several rounds were fired from all types of mobile materiel.

The Small Arms Exhibition included firings against free toy balloons, using tracer ammunition in different types of machine guns. The new Browning 50-caliber machine gun was displayed in action against a "tank" 1500 yards away. The Thompson submachine gun and the Thompson auto rifle were also demonstrated.

The exhibition and maneuvering of the self-propelled gun mounts, tanks, tractors and trailers

(*Continued on page 122*)

From World Wide Photos.

75-MM. GUN AND 105-MM. HOWITZER MOTOR CARRIAGE GOING THROUGH STREAM OF WATER; EQUIPPED WITH WATERPROOF MOTOR AND TRANSMISSION

NEW CONSTITUTION FIRST ON BUSINESS MEETING SCHEDULE

To Be Read on Wednesday, December 7, in Connection with 1921 Annual Meeting

The proposed new constitution for the Society, which was published in the August 1921 issue of MECHANICAL ENGINEERING, is scheduled as the first order of business reading on Wednesday, December 7, in connection with the 1921 Annual Meeting.

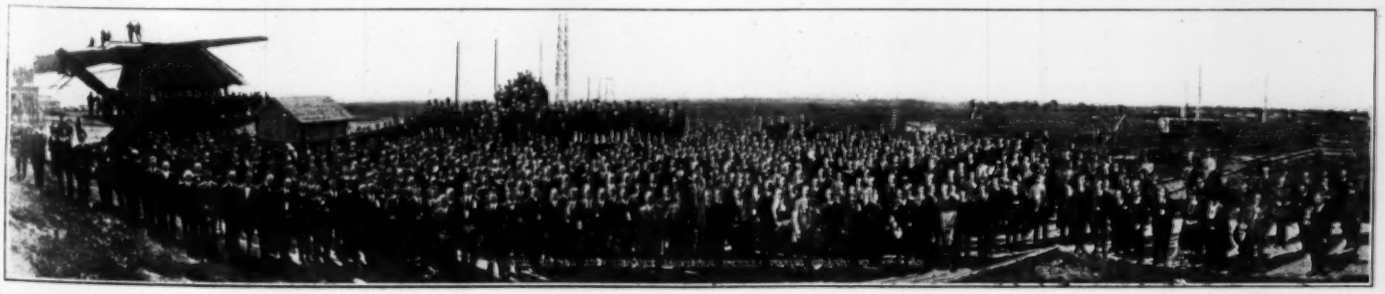
The report of the Special Committee on Organization of Society Activities, abstracted elsewhere in this issue, recommends that at this meeting discussion be given to the proposed new constitution but that action upon this new draft should be brought before the members of the Society for a vote on its adoption and redeferred to the Annual Meeting of 1922. This plan has received the sanction of the Council and if it meets the wishes of the members, as expressed at the business meeting, it will be carried out.

Discussion By Local Sections Solicited

This will give ample time for the planning and formulation of the by-laws and rules which must accompany the new constitution when it goes into effect. Meanwhile a general notice has been sent to all the Local Sections this fall asking them to bring the matter of the new constitution before their opening meetings and provide an opportunity for discussion. The Committee on Constitution and By-laws will meet some time in November and collate this discussion together with written comments which have come in as the result of the invitation to all members to study the new document and express their views upon it.

Provides for Basic Principles Only

An essential requirement of the new constitution must be to provide for basic principles only of operation of the Society activities. The rate of growth of membership, of group activities, both territorial and professional, of technical assignments undertaken is continuous. So, also is the number of contacts the Society, as a body, is making with other agencies both for technical work and for association work in the consolidation of the engineering profession. Therefore,



GROUP FORMING INSPECTING PARTY AT ABERDEEN PROVING GROUND

the utmost flexibility must be provided in our new constitution.

An examination of the document reveals that the basic idea in the minds of the Constitution and By-Laws Committee in forming it was to remove from the constitution all non-essentials. An outstanding example of this is the proposal to transfer to the By-Laws the operation of committees of all kinds, including even standing committees and nominating committees for the election of officers, leaving only in the constitution the clauses: "the Council shall have every control of the activities of the Society, subject to the limitations of the constitution" and "the Council may by resolution delegate specific power to any member or to any committee of members." These two clauses are broad enough to take care of any conditions regarding the creation or appointment of committees for an indefinite period and, in fact, they do not restrict the complete reorganization of all the committees of the Council if such ever becomes necessary.

Fundamental articles of the new document to be examined are the new statements of the objects of the Society, the professional conditions of its members and the qualifications for admission. An entirely new *composition* of the Council is also recommended to provide for both professional as well as geographical representation.

Regarding simplification, it is significant to note that the existing constitution contains sixty articles and that the new proposal contains only forty-eight, explained in about one-quarter of the number of words. This is accomplished, as already intimated, by transferring all details to the By-Laws and rules upon which the Constitution and By-Laws Committee is now working.

EXECUTIVE COMMITTEE OF THE FUELS DIVISION MEETS

At the Fuels Division Executive Committee meeting held on September 21, it was decided to extend a generous invitation to all members of the Society to submit papers to the Meetings and Papers Committee of the Division for consideration at the fuel sessions of the Annual and Spring meetings of the Society.

It was also decided that the papers to be presented at the Atlanta, Ga. meeting (Spring 1922) should be on general fuel subjects and not be limited to any one phase of this broad subject. At the 1922 Annual Meeting, the subject for discussion will be the automatic stoker and its development. It is desired that papers on this subject shall treat of progressive thought toward the elimination of faults and deficiencies in the stoker of today, special reference being made to clinker prevention, ash removal, regulation of coal feed and air supply, etc.

The manuscripts for the Spring Meeting should be in the hands of Mr. David Moffat Myers, Chairman of Meetings and Papers Committee of the Fuels Division, not later than March 1, 1922, and for the 1922 Annual Meeting by September 1. It is the hope of the Executive Committee that many interesting and valuable contributions will be forthcoming without any further attention on the part of Mr. Myers' committee.

Ten of the Local Sections of the Society have appointed individual fuel committees. No doubt other Local Sections are planning to have fuel committees, and they are urged to appoint them.

TEXTILE DIVISION PLANS MEETINGS FOR COMING YEAR

The Textile Division is planning the following meetings during the coming year: joint meeting with the Metropolitan Section in Paterson, N. J., in November 1921; session at Annual Meeting in December 1921; meeting in Philadelphia, January 1922; session at Spring Meeting in Atlanta, Ga., 1922; and a joint meeting with the Boston Local Section, April 1922. The details of these meetings are now in process and the dates will be announced shortly.

700 ENGINEERS GUESTS AT ABERDEEN MEETING

(*Continued from page 121*)

kept the crowd on edge for over an hour with speed and rough-riding exhibitions. The 75-mm. gun tractor mount circled and crisscrossed the field at a 25-mile gait, barely missing being crushed beneath the ponderous battle tanks and providing thrills for some spectafors who were daring enough to venture into the exhibition arena.

A tractor carrying an electric generating set connected by cable to a second tractor bearing a gun and driven by electric motors attracted considerable attention, as did the tractor with removable track, permitting it to be operated as an ordinary wheeled vehicle on roads. The 75-

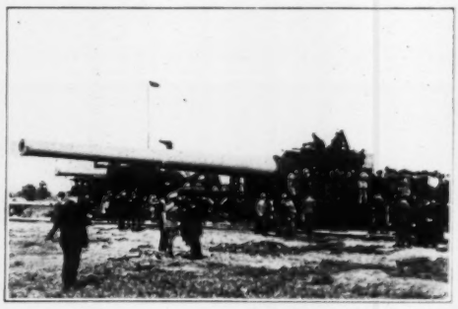
From World Wide Photos.

16-IN. DISAPPEARING GUN, WEIGHING 1,500,000 LB., WITH RANGE OF 44,000 YD., BEING FIRED

mm. gun mount was proven to have a waterproof motor by running it through a pool of water 5 ft. deep.

A collection of ordnance, tractors and equipment captured from the Germans was on view in the Exhibition Hall, where there was also a complete American ordnance field repair train consisting of ten four-wheel-drive trucks with electric generating set, every conceivable kind of electric-driven machine tool and all the miscellaneous equipment.

In the evening the newly developed flashless



From World Wide Photos.

16-IN. ARMY GUN MOUNTED AND STATIONARY

powder was demonstrated in comparison with ordinary smokeless powder. It gave only a small reddish glow compared to the brilliant flash of the old-style propellant. Shrapnel firings were made with various types of time fuses.

As a stimulant of interest in the problems relating to the design, construction and use of ordnance, the gathering was a decided success. Wars cannot be entirely of the past, and a thorough understanding of ordnance by the engineering profession is essential.

For Details of
A.S.M.E. ANNUAL MEETING
See Pages 754-755
of
Section One of This Issue

SOCIETY ACTIVITIES COMMITTEE PRESENTS REPORT TO COUNCIL

Study of Administrative and Professional Agencies with 16 Recommendations

A special study of the relationships between the various agencies charged with the responsibilities for exercising the administrative and professional functions of the Society has been made by a Committee consisting of L. P. Alford, *Chairman*, George A. Orrok, Joseph W. Roe, E. Howard Reed, James H. Herron, William B. Gregory and Dexter S. Kimball.

At the meeting of the Council on October 10 the committee made its report which included sixteen recommendations, as listed below together with as much of the accompanying preamble to each recommendation as is necessary for explanation.

Recommendations

The Local Sections now number 48. During the past year eleven Professional Divisions have been established. Therefore we now have 59 inter-Society organizations resulting from rapid intensive development. It is always wise to consolidate gains before putting forth new efforts.

1. Defer all action to establish new Local Sections and new Professional Divisions until 1923.

The revision of the Constitution now before the Society should contain the basic principles which are to govern the development of Society inter-organization for many years to come:

2. That at the Annual Meeting in December 1921, full discussion be given to the proposed new constitution, but that action upon this new draft to bring it before the members of the Society for a vote on its adoption be deferred until the Annual Meeting in 1922.

Considering the proposal to establish regional headquarters and appoint regional secretaries the recommendation of the committee has been governed largely by the foreseen financial situation during the next eighteen months:

3. That no steps be taken at present to establish regional headquarters or to appoint regional secretaries.

In considering the proposal to establish local sub-sections rather than divide existing local sections, a favorable opinion on this proposal is in harmony with recommendation (1) of this report. The committee believes that the present geographical limits should stand, unless there are some peculiar conditions which made a modification justified:

4. That unless there are peculiar conditions which should govern, local sub-sections should be established instead of new local sections within the territories of existing Local Sections.

A study of the financial resources of the society in relation to its membership indicates that a change is taking place which may demand a progressively increasing revenue per member to carry on the Society's activities and to permit growth:

5. That there be determined from an analytical study the proper membership revenue and proper financial reserve for our present membership, and for the increase of membership year by year that may be expected during the next decade.

Until a report has been rendered, based on the analytical study indicated in recommendation 5, the committee believes that it is unwise to increase membership dues:

6. That no move be made at the present time to increase the dues of any grade.

It is the practice in many engineering societies both here and abroad to make a binding charge for Transactions:

7. That a charge of $1.50 be added to the annual bill of each member to defray the cost of binding the copy of Transactions which he receives from the Society.

In the local-section delegates' conference held in New York in December, 1920, several of the delegates expressed their willingness to waive the 25 per cent of the initiation fees now granted to Local Sections:

8. That during the year 1922, and until regranted by action of the Council, 25 per cent of the initiation fees now granted to Local Sections be withheld and the funds so released from local section activities be applied to the budgets of headquarters and the standing committees.

The Local Sections have come to be an integral part of the administrative machinery of the Society. In contrast, the function of the Professional Divisions is technical. Their efforts and activities have to do with technical interests of the membership. They should originate professional papers, conduct their presentation and discussion at meetings, carry on research and secure reports within restricted technical fields and work for the upbuilding of the professional influence and standing of the Society:

9. That the new draft of the constitution state, and distinguish between, the function of the standing committees, professional divisions and local sections.

To forestall and to prevent possible duplication of effort in securing professional papers:

10 (*a*). That there be no restriction on the right or privilege to solicit papers in the name of the A.S.M.E., on the part of the Professional Divisions, Committee on Meetings and Program and the Committee on Publication and Papers, and that the Executive Committee of the Local Sections have the right to solicit papers and speakers locally.

(*b*). That the correlating agency for all papers presented at all general meetings of the Society be the Committee on Meetings and Program, and this Committee have the decision as to the form of preparation in printed form or otherwise of all papers to be presented at all general meetings.

(*c*). That the Committee on Publication and Papers select all professional papers and other matter comprising the permanent literature of the Society.

Broadening the privilege of soliciting professional papers brings the question as to what procedure should be followed in setting up and conducting Professional Division sessions at general, regional, and local meetings:

11. That no change be made in the present procedure of giving the Committee on Meetings and Program full charge of all general meetings, and local executive committees full charge of all Local Section Meetings. For either kind of meeting the Professional Divisions may provide technical papers.

12. That no meetings of the Professional Divisions shall be held apart from the general, regional or local meetings of the Society, except as a participation in a joint meeting of another society.

Restricting the function of the Professional Divisions to technical activities brings the question as to what procedure should be followed in financing Professional Division activities which are conducted jointly with a section or a committee of the Society:

13. That any joint activity participated in by a Professional Division and a section or a committee of the Society shall be financed by the section or committee.

Recommendation 12 provides that a Professional Division may hold a meeting in connection with some other national or local society or chapter of a national society:

14. That in every case where a Professional Division wishes to initiate or organize a coöperative activity with some other national society it must first secure authorization for such activity from the Council and a grant of funds for its execution; and further in case a Professional Division wishes to hold a meeting with a local society or some local section or chapter of a national society, such a local joint activity can only be held in coöperation with the local section having jurisdiction within the territory where such an activity is planned.

Inasmuch as preceding recommendations make practically every meeting of the Society a joint responsibility of an administrative agency and a Professional Division, the question arises as to the procedure to be followed in the conduct of any such meeting:

15. That, without relieving the administrative agencies from the responsibility of the proper conduct of any meeting of the Society or a sub-division thereof, wherever technical papers are secured through the efforts and activity of Professional Divisions, the executive officer of the Division involved be invited to assist in the conduct of the meeting in the capacity of a chairman.

It may confidently be expected that the increased activity of the four agencies soliciting technical papers will largely increase the volume of the Society's literature:

16. That in order to make uniform and to codify the publications of the Society, all appropriations for printing be made to the Committee on Publication and Papers, and that the responsibility for the printing of all professional matter of the Society be placed upon this committeee.

COMMITTEE PERSONNEL ENGAGES ATTENTION OF FIRST COUNCIL MEETING

Report of Finance and Other Committees Accepted—Executive Committee Transactions Approved

The opening meeting of the Council for the new season was held in the rooms of the Society on October 10. There were present: Edwin S. Carman, *President;* L. P. Alford, R. B. Wolf, R. H. Fernald, and John L. Harrington, *Vice-Presidents;* C. L. Newcomb, C. Russ Richards, F. O. Wells, E. C. Fisher, E. F. Scott, H. M. Norris, and Carl C. Thomas, *Managers;* D. S. Jacobus, Chas. T. Main and F. J. Miller, *Past-Presidents;* Geo. A. Orrok, *Chairman, Publication and Papers Committee,* E. B. Katte, *Chairman, Professional Divisions Committee,* Wm. H. Kenerson, *Chairman, Local Sections Committee,* Fred R. Low, *Chairman, Power Test Codes Committee,* and S. D. Collett, *representing Mr. Oberg on the Finance Committee;* Wm. H. Wiley, *Treasurer;* Calvin W. Rice, *Secretary.*

The Secretary announced the names of the officers-elect for 1922, who had been invited to the meeting and of whom Sherwood F. Jeter, Horace P. Liversidge, and Walter S. Finlay, Jr., *Managers-Elect,* were present and introduced.

Work of Executive Committee Approved

The first action was the confirmation of the business transacted by the Executive Committee of the Council during the recess period. This included actions on the new Year Book, on the outstanding Boiler Code interpretations, on committee vacancies and appointments, and on the special research to extend the upper limits of the steam tables.

The committee appointments approved by the Executive Committee were: H. V. Wille, Sub-Committee on Air Tanks and Pressure Vessels of the Boiler Code; S. H. Barnum, F. G. Cox and L. E. Connelly, representatives of the American Boiler Manufacturers Association, on the Boiler Code Sub-Committee on Rules for Inspection; Geo. E. Hammann, E. H. Reed and Ralph E. Flanders (in place of James Hartness, resigned), on the Sectional Committee on Standardization and Unification of Screw Threads; E. P. Warner on Sectional Committee on Aeronautic Safety Code; Alphonse A. Adler on the Sectional Committee on Standardization of Shafting, in place of W. D. Ennis, resigned; John J. Flather on the Joint Committee on Standardization of Steel Roller Chains, in place of C. H. Benjamin, resigned; Louis Doelling, Walter Jones, C. R. Neeson, R. F. Massa, A. W. Mellowes and J. E. Starr, as representatives of the Society on the Sectional Committee on Safety Code for Mechanical Refrigeration; L. V. Benet to represent the Society at the exposition of the Association des Ingenieurs Sortis de L'Ecole de Liege; R. M. Gates as A.S.M.E. representative at Secretary Hoovers' Conference on Highway Construction; A. A. Potter to represent the Society at the Steel Treaters' Convention.

Council Business

An important action was the acceptance of the annual report of the Finance Committee for the fiscal year closing September 30, 1921, and of the budget of income and expenditures for the new fiscal year. Both of these documents will be distributed at the Annual Meeting and will be abstracted in MECHANICAL ENGINEERING.

The annual reports of all committees were received and accepted and will be distributed at the Annual Meeting and abstracted in MECHANICAL ENGINEERING.

Committee on Local Sections. The St. Paul-Minneapolis Section was disbanded and Sections at St. Paul and Minneapolis respectively were authorized in its place.

ALL NEW OFFICERS FOR 1921 ELECTED ON REGULAR BALLOT

All the new officers of the Society as well as all the A.S.M.E. delegates to the American Engineering Council, as nominated by the regular nominating committee, were elected unanimously.

According to the by-laws the ballots from the voting membership closed on September 28 and the Tellers of Election, Messrs. H. G. Tyler, R. S. Austin, and F. J. Steele, Jr., counted them immediately and reported to the Secretary who announced the result on October 1st. The officers elected were:

For President: (one year)
DEXTER S. KIMBALL, Ithaca, N. Y.

For Vice-President: (two years)
COL. E. A. DEEDS, Dayton, Ohio.
ROBERT SIBLEY, San Francisco, Cal.
L. E. STROTHMAN, Milwaukee, Wis.

For Managers: (three years)
SHERWOOD F. JETER, Hartford, Conn.
HORACE P. LIVERSIDGE, Philadelphia.
HOLLIS P. PORTER, Tulsa, Okla.

For Treasurer: (one year)
WILLIAM H. WILEY, New York, N. Y.

For Manager: (one year, to fill unexpired term of D. S. Kimball)
WALTER S. FINLAY, JR., New York, N. Y.

The A.S.M.E. delegates to the American Engineering Council for two years are:

FRANCIS BLOSSOM, New York, N. Y.
CHARLES A. BOOTH, Buffalo, N. Y.
GANO DUNN, New York, N. Y.
H. H. ESSELSTYN, Detroit, Mich
W. S. LEE, Charlotte, N. C.
I. E. MOULTROP, Boston, Mass.
JOHN A. STEVENS, Lowell, Mass.
A. E WALDEN, Baltimore.
PERLEY F. WALKER, Lawrence, Kan.

The new officers elect of the Society were introduced to the Council at its meeting on October 10. The successful candidates go into office at the adjournment of the Annual Meeting. This is the second year of operation of the plan of announcing the name of the president two months in advance of the Annual Meeting that he may immediately begin work on the lection of members to fill the vacancies on the standing committees. This is done that committees may organize at the time or after the Annual Meeting and start their programs for the new year. The plan was very successful last year.

Student Branches. Petitions of the students in the Textile Engineering Department and members of the Textile Engineering Society at Lowell Textile School for a Student Branch there were granted.

Research Committee. Philip Darling, *Chairman*, Ed. F. Miller, W. E. Jerauld, Geo. H. Clark, I. E. Moultrop, A. M. Houser, A. L. Fitch, and G. S. Coffin were approved as a Special Committee on Sudden Initial Pop Lift of Safety Valves.

C. R. Richards, Herman Diederichs, C. H. Bierbaum, C. J. Bacon, A. L. Ellis, C. E. Lucke, L. S. Marks, F. Paul Anderson, F. J. Cole, S. W. Stratton, R. H. Rice, A. W. Duff, D. S. Jacobus, S. F. Jeter, A. A. Potter, R. H. Fernald, W. W. Bird, E. J. Miller, H. G. Reist, E. J. Prindle, C. E. Skinner, E. M. Herr, E. A. Deeds, H. F. Moore, G. A. Orrok, H. C. Dickinson, and F. L. Wardenburg were approved as an Advisory Committee to the Research Conference of the Engineering Division of the National Research Council.

Boiler Code. Interpretations Numbers 364, 365, 366, 368 and 369 were approved and will be published in MECHANICAL ENGINEERING in the usual way.

Standardization. The Joint Committee on the Revision of the "Briggs" Standard Pipe Thread was discharged.

Arthur R. Baylis, Nicholas S. Hill, Jr., H. A. Hoffer, E. L. Morel, C. W. Stephen, J. Roy Tanner, and W. S. Timmis were approved as members of the Sectional Committee on Standardization of Pipe Flanges and Fittings, and at the same time the A.S.M.E. Committee on Flanges and Pipe Fittings was discharged.

Edgar B. Nichols and Gilbert A. Young were approved as the A.S.M.E. representatives on the Joint Committee on Steel Roller Chains.

Power Test Codes. M. D. Church was approved on the Power Test Codes Committee on Steam Turbines and Samuel B. Flagg on the Committee on Instruments and Apparatus.

A. G. Christie, C. E. Lucke, P. Diserens, E. F. Miller, and G. A. Orrok were approved as members of the Main Committee on Power Test Codes.

Safety Codes. John W. Upp, *Chairman*, John Price Jackson, Carl M. Hansen, H. L. Whittemore, and Wm. A. Viall were approved as a Standing Committee on all Safety Codes, except the Boiler Code.

CALVIN W. RICE,
Secretary.

THE SECRETARY'S LETTER

Twenty-five Years of Banking Service Sets Admirable Example of Community Service

The Secretary is very grateful to those members who, thinking in terms of the whole Society, send in from time to time ideas promoting thought and suggesting ideals which may be applied to the profession of engineering.

Mr. Ambrose Swasey has mailed an exquisite brochure, descriptive of a quarter of a century of banking service of the Cleveland Trust Company, of which he is a director. Some of the outstanding comments of the directors are quite pertinent to us. The first impression from the half-dozen separate personally signed articles is the uniformity of conception which each director has of the spirit permeating the whole institution.

It is the ambition of our own officers that all connected with the Society shall share in the concept of the underlying motive for our organization, and take special pride in the privilege of being permitted to execute that concept.

As expressed by its President, the outstanding motive which the Cleveland Trust Company has, is that it shall be "a useful servant in the community." That should be the underlying motive of each person and of every aggregation of persons, in whatever profession, and eventually it will be universally so. Although not evident to all, compensation, in general, is now determined by the degree of output of service to the community.

Another interesting phase of the Trust Company's development is the extension of the bank by branches. It has now 28 neighborhood branches in Cleveland, and has so succeeded that one person in four of the entire population of that city is a depositor.

Our Society, as all know, is a strong believer in branches, and has now 48 in the United States. It is the most virile policy of any of the Society's activities to extend these branches, or if possible bring to the member, wherever he may be, the benefits of association in the profession. We have just exchanged letters with our fellow-member, Mr. F. H. Clark, consulting engineer to the President of China, leading us to hope that at no distant time some kind of a branch in that country will be created.

It may be of interest to know that the entire Board of Directors of the Cleveland Trust Company meets twice a week to direct the Bank's affairs. Our Council and similar governing bodies of other societies meet from four to eight times a year, and think that is a good deal. In the spirit of not only maintaining interest, but of securing the benefit of wise counsel, it has been the habit of the Secretary to bring most matters to the attention of the Council, although not obviously necessary. This is undoubtedly a great element of strength of our Society, but there is a phase of the Cleveland Trust Company directorate which we might adopt more extensively—the directors give much time to committee service.

Mr. Swasey, in his letter says, "A continuing service has become the heritage of succeeding generations of Cleveland Trust Company Directors." On the contrary, in our Society the converse is the history; even correspondence received within the last month says: "The simple truth of the matter is, so far as I can see now, unless we can devise some method to relieve the members of the committees.....it will be almost impossible to get such men as are now on committees to carry on the work." Mr. Swasey, in his article, continues, "it is not a rare occurrence for a director to give almost as much of his working day to the affairs of the Cleveland Trust Company as he devotes to his own business."

Another director says, "A bank's position in a community is determined not only by the amount of its deposits and the security offered to its depositors, but even more by the confidence the public has in the integrity of its officers and directors." In our Society, a continuing sense of responsibility on the membership in selecting their delegates to Local Sections conferences, who in turn select the Nominating Committee for officers in true democratic fashion, is obvious if we are to maintain the position of our Society in the confidence of the profession and public.

Another out-standing characteristic of the Cleveland Institution is contact between customer and staff. This same policy has been your

Coming Section Meetings

Atlanta. November 22. Subject: Water Power Developments of the Southeast, by C. G. Adsit, Consulting Engineer, Ga. Ry. & Power Co.

Central Pennsylvania. November. To be held at Williamsport, Pa.

Chicago. November 21. Joint meeting with Western Engineering Society in their rooms. Symposium of Engineers. Speakers to be announced later.

Cleveland. November 1. At Hotel Winton. Subject: Die and Mold-Making by Machine, by Jas. F. Keller, of the Keller Mechanical Engraving Co. A collection of samples will be on exhibition.

Colorado. November 25. At Metropole Hotel, Denver, Colorado. Subject: Properties of Cast Iron and Gray Iron Foundry Methods, by William Lester, of the Vulcan Iron Works.

Connecticut State.

Bridgeport Branch. November 17. At Chamber of Commerce. Speaker: Hiram P. Maxim, of the Maxim Co.

Kansas City. November 21. Two-day regional meeting.
Geology of the Oil and Gas Industry:—Dr. L. C. Snider, Chief Geologist, Empire Companies, Bartlesville, Okla., Everett Carpenter, Winfield, Kansas, Chief Geologist, Emerald Oil Co., M. M. Valerius, Mayo Bldg., Tulsa, Okla. Consulting Geologist.
Machinery Methods and Difficulties of Drilling:—R. D. Bush, of Empire Co., Eldorado, Kansas, Ross M. Stuntz, Gen. Supt. of Production, Empire Companies, C. P. Demit and Mr. A. L. Bramer, Gypsy Oil Co., Clinton Bldg., Tulsa, Okla.
Transportation of Oil by Pipe Lines:—S. B. Severson, Empire Companies, Eldorado, Kansas.
Mechanical Methods of Refining:—Floyd Brown and Clay Briggs, Empire Companies, Bartlesville, Okla.
Chemical Processes:—Dr. Francis, of Cosden Co., Tulsa Okla., Dr. Burton, Standard Oil Co.
Products of the Oil Industry and Their Uses.
Discussion of the Oil Supply of the World:—Mr. Ambrose, of the Bureau of Mines, Washington, D. C.
Financial Side of the Oil Business.

Metropolitan. (N. Y. C.) November 14. Subject St. Lawrence Canal. Joint meeting with A.I.E.E., A.I.M.E., and A.S.C.E.

Mid-Continent. Luncheons at Tea Cup Inn, Tulsa, Okla., every Friday noon.

Philadelphia. November 22. At Roof Garden, Adelphia Hotel. Annual Smoker and Get-together of Section. Commander H. C. Richardson of U. S. N. to speak on Experiences on the NC-3 during the Trans-Atlantic Flight. Moving pictures taken during the flight will be shown.

San Francisco. Luncheons at the Engineers' Club, every Thursday noon.

Toledo. November 17. At Toledo Commerce Club. Subject: The Industrial Engineer in Business, by Clifton B. Reeves, of Willys Overland Co.

Virginia. November. Fall Rally meeting. Subject: The Engineers' place in Industry.

Worcester. November 17. Joint meeting with the Worcester Section of A.I.E.E. Meeting to include an afternoon inspection trip, buffet lunch and an evening session.

Secretary's emphasized method, and with the Society's increasing work it is obvious that a large corps is necessary for our many committees and activities.

One of the directors, Mr. Samuel Mather, comments on the privilege which the Trust Company has of loaning its officers for many services to the public, of which the public has no knowledge. Thus you will see the sense of obligation to the community which the directorate, individually and collectively seems to feel. Here again, this has been the characteristic attitude of the Council of the A.S.M.E. toward The Federated American Engineering Societies and other joint activities for the public good. However, it may be still further developed with advantage.

CALVIN W. RICE, *Secretary.*

Committee Meetings

Fuels Division, executive committee, on September 21.

Professional Divisions, standing committee, on September 21.

Mechanical Transmission of Power, sectional committee under the A.E.S.C., on September 23–24.

Railroad Division, executive committee, on September 30.

Local Sections Committee, on October 1.

Textile Division, N. Y. section sub-committee, on October 3.

Power Test Codes Main Committee on October 3.

Steel Roller Chains, joint committee, on October 3–4.

Plain Limit Gages for General Engineering Work, sectional committee under the A.E.S.C., on October 5.

Gas Power Division, executive committee, on October 7.

Membership Committee, meetings held weekly.

Recent Section Meetings

Atlanta. October 25. Get-together dinner.

Boston. October 10.

Buffalo. October 5. At Lafayette Hotel. Subject: The Construction of a 360-Million Gallon Filtration Plant, by Theodore A. Leisen, Board of Water Commissioners, City of Detroit.

Chicago. October 17. Subject: The Colfax Station, by Mr. Clark, of Dwight P. Robinson Co. Moving pictures with lecture.

Colorado. September 23. At Metropole Hotel. Subject: History and Products of the Leyner Engineering Co., by H. Levine, of the Leyner Engineering Works, Littleton, Colo.

Columbus. October 21. At Southern Hotel. Section was host of the Associated Columbus Engineering Societies.

Connecticut State. September 19. Election of officers.

Bridgeport Branch. September 22. At Hotel Strafford. Subject: Engineers' Part in Modern Industry, by Charles Ferguson.

October 20. At Hotel Stratfield. Subject: Relation of Engineering and Management, by Walter Rautenstrauch, of J. G. White Corp., N. Y. C.

New Britain Branch (Proposed) September 27. Illustrated Lecture on The Automatic Telephone, by Edward H. Everit, Chief Engineer, South N. E. Tel. Co.

New Haven Branch. September 19. At Mason Laboratory. Moving pictures were shown of the Machine-Tool Industry. Talks by representatives from Brown & Sharpe on No. OG Automatic Screw Machine and No. 2A Universal Milling Machine; representatives from Pratt and Whitney on 8 Vertical Rotary Surface Grinder; representative from National Acme Co. on Gridley Automatic-Screw Machine.

Waterbury Branch. October 1. Outing at "Stone House," Shepaug, Conn. Visit to the New Reservoir, Shepaug Water-Shed. Speaker was Robert A. Cairns, Engineer.

Indianapolis. October 28 & 29. Two-day Professional Session. Papers presented: Stoplshok Wheels, Their Construction, Use and Results Obtained Therefrom, by B. F. Seymour, Washington, D. C.; Stellite Metal and Its Application to the Arts, by Elwood Haynes, of Kokomo, Indiana; Steam as a Motive Power for Commercial Vehicles, by Fred Hamilton, of Indianapolis, Ind.; Acid-Resisting Alloys—Research Work Covering Non-ferrous Metals in Its Application to their Acid-Resisting Properties, by George A. Drysdale, of Indianapolis, Ind.; Second day, inspection of the engineering buildings and some equipment testing apparatus of special design at Purdue University and later football game between Purdue and Iowa State Colleges.

Los Angeles. October 7. Subject: Hydraulic Turbines, by John Sturgess, of Worthington Co.

Metropolitan. (New York) October 19. Subject: Engineering Financing. Joint meeting with A.I.E.E., A.S.C.E. and A.I.M.E.

October 28. Subject: Industrial Fuel Gases. Held in Newark, N. J.

October 31. Fall Get-together in New York City.

Minnesota. September 13. Subject: Pulverized Fuel, by Mr. Mason, Engineer for the Hennepin Atomized Fuel Co. Inspection trip through the Hennepin Atomized Fuel Co. plant and the boiler room in the Phoenix Bldg., Minneapolis, Minn., where pulverized fuel is used.

October. At Elks Club. Subject: Public Utility Valuation, by Delos Wilcox, Public Utility Expert. Joint meeting with Minnesota Section, A.I.E.E.

Philadelphia. October 25. At Engineers' Club. Subject: Public Utilities, by W. C. L. Eglin, of the Philadelphia Electric Co.

Pittsburgh. September 23. At William Penn Hotel. Joint meeting with Mechanical Section of Engineers' Society of Western Pennsylvania. Moving pictures and colored lantern slides of the Caribou Hydroelectric Project, on the North Fork of the Feather River, Plumas County, California, were shown. Albert A. Northrop, Engineer, Stone & Webster, Inc. lectured on the pictures and other technical details.

Providence. October 4. Joint meeting with Management Section. Subject: Safety Appliances, by Franklin D. Warren, of American Mutual Liability Insurance Co. Talk was illustrated with moving pictures showing an actual train wreck and the causes and many other accidents and near accidents.

Rochester. October 6. With Industrial Management Council of the Rochester Chamber of Commerce. Mr. L. W. Wallace spoke on The Elimination of Waste in Industry.

St. Louis. September 30. At Hotel Claridge. Mr. William E. Doll, of the Henry R. Worthington Co. spoke on Recent Developments in Pumps.

San Francisco. August 25. Guests of the American Manganese Steel Co. for luncheon and an inspection trip through plant. Visited Union Construction Co. and inspected the electric drive on a revenue cutter.

September 1. Luncheon and talk by H. W. Crozier, on Difficulties of Getting Salmon Up and Down Stream Past High Dams.

Syracuse. October. At Onondaga Hotel.

Toledo. October 20. J. B. Nordholt addressed this meeting.

Tri-Cities. September. Fuel meeting and a trip to Iowa City and Ames.

Utica. October 6. Discussion of activities for coming year.

Personals

R. B. CLAPP, manager of the Cleveland district of the Andrews Bradshaw Co. for the past five years, has taken over the Ohio territory with his own organization, the R. B. Clapp & Co., and will continue to conduct the combined business with Cleveland as headquarters.

GEO. B. MASSEY, of Chicago, Ill., left New York early in September for an extended business trip through Europe and Asia. He will be gone for about six months.

WARREN S. MARSDEN has left the employ of Morgan & Wright, Detroit, Mich., and is at present located in Newburgh, N. Y.

SYDNEY W. BURTON has recently opened an office in Providence, R. I., to practice mechanical consulting engineering.

E. W. LAZELL of Portland, Ore., has been appointed as the A.S.M.E. member of the committee for consideration of sites for the 1925 exposition in Portland.

DAVID GUELBAUM of Syracuse, N. Y., has recently been granted a patent for a closed high-temperature gas burner, which is especially adapted for laboratory experimental work in colleges and chemical plants.

REUBEN HILL has been appointed vice-president of the Marlin Firearms Corporation, New Haven, Conn., a reorganization of the firm of Marlin Firearms Company.

EARL F. HEIMPEL, formerly chief engineer of the Edison Portland Cement Co., Stewartsville, N. J., has resigned to enter the sales force of the M. J. Dougherty Co., piping fabricators and engineers of Philadelphia.

W. B. MONTGOMERY, previously staff service director of C. E. Knoeppel & Co. Inc., industrial engineers of New York City, is now located in Rochester, N. Y., with A. F. Stock, formerly of the same company, under the firm name of Montgomery & Stock, industrial engineers.

LAURENCE MEHARG is now with the Hazel Atlas Glass Co., in its general offices at Wheeling, W. Va.

H. E. LYNES is located in the Detroit office of M. H. Detrick Company.

H. W. TOWNSEND, formerly district manager of the Aldrich Pump Company, Pittsburgh, Pa., office, has returned to the main plant in Allentown, Pa., as works manager.

J. W. MACMORRIS has accepted a position with the Mercer Motors Company of Trenton, N. J., as factory manager.

EDWARD KOPPER, JR., formerly assistant superintendent of the American Hoist & Derrick Co., St. Paul, has severed his connection with that concern to become associated as a partner in the H. C. McNAIR Company of St. Paul, agents for manufacturers of steel and railway supplies.

A. BOWMAN SNAVELY has been promoted from assistant to chief engineer of the Hershey Chocolate Company at Hershey, Pa.

GEORGE H. HARTMAN, mechanical engineer of the Locomotive Appliance Company, Toledo, Ohio, has accepted temporarily the position of mechanical engineer for the Autovend Company and The Service Machine Company, both of Cleveland, Ohio.

Appointments in the Teaching Profession

PROF. COMFORT A. ADAMS has resigned as chairman of the Division of Engineering of the National Research Council and is devoting his full time to his work at Harvard Engineering School, Cambridge, Mass. Alfred D. Flinn, vice-chairman of the Division and secretary of Engineering Foundation, was elected to fill the vacancy.

W. K. KIRBY, whose connection with Jar[illegible] Stewart & Co., New York City, recently ter[illegible]nated, has accepted the chair of petroleum er[illegible]neering at the Colorado School of Mines, Gold[illegible] Colo.

S. R. Cummings, formerly instructor at the Massachusetts Institute of Technology, is now assistant professor of mechanical engineering at the Oregon Agricultural College, Cornvallis, Ore.

Russell G. Paddock has resigned his position as tool designer and engineer with the Indiana Lamp Co. of Connersville, Ind., and has accepted an instructorship in the School of Mechanical Engineering at Purdue University, Lafayette, Ind. Allen C. Staley, formerly mechanical engineer for the Standard Steam Corporation, St. Louis, Mo., has become associate professor of gas and automotive engineering at the same university.

August Ulmann, Jr. is now instructor in mechanical engineering department at the University of Pennsylvania. He was formerly connected with the General Chemical Company, Marcus Hook, Pa.

New Instructors at the University of Illinois

William H. Severns, who was instructor in mechanical engineering at the University of Illinois 1917–1919, and has since served as assistant professor of mechanical engineering at the University of Wisconsin and as assistant field engineer for the New Jersey Zinc Company, at Palmerton, Pa., has returned to Urbana as assistant professor of mechanical engineering, as noted in the September issue of Mechanical Engineering.

John Dallas Wise has been appointed superintendent of the Foundry Laboratory at the University of Illinois. Since 1919 he has been identified with the Osborn Manufacturing Company, Cleveland, Ohio, manufacturers of foundry molding machines.

Russell James Englehart is now assistant superintendent of the Forge Laboratory at the University of Illinois. With the exception of one year's service in the United States Army, he has been employed continuously since 1915 by the Winchester Repeating Arms Company, for which he made an investigation of the manufacturing and heat treating of steel.

William Ruprecht Osgood, who during the past year has served as assistant in mechanical engineering at the Massachusetts Institute of Technology, at the same time taking graduate work in dynamics, has become instructor in theoretical and applied mechanics at the University of Illinois.

Crandall Zachariah Rosecrans, a graduate of the University of Illinois, and for the past two years a research graduate assistant in mechanical engineering in the Engineering Experiment Station there, has been appointed research assistant in mechanical engineering.

New Members of the Society

The following is a list of those who have qualified for membership in the Society between the dates of August 1 and October 1. The grade is indicated by the symbol after the name; i.e., M-Member; A-Associate; AM-Associate-Member; J-Junior.

ACKERMAN, Guy O.—J, Worcester, Mass.
AKINS, Arthur W.—AM, Bayonne, N. J.
ALEXANDER, Carleton E.—J, Cleveland, Ohio.
ALLARDT, Ernest W.—J, Washington, D. C.
ALLERTON, O. J.—AM, Chicago, Ill.
ALTHOUSE, William S.—AM, Los Angeles, Cal.
ANDERSON, Woodworth—AM, Seattle, Wash.
ANGEVINE, Leland C.—McPherson, Kans.
APPERT, Henry J., Jr.—AM, Leonia, N. J.

BANKER, Oscar H.—J, Racine, Wis.
BANTA, Herbert D.—AM, Green Bay, Wis.
BARBA, Charles E.—M, Watertown, Mass.
BARNES, Joseph M.—AM, Philadelphia, Pa.
BARROWS, Donald S.—M, Rochester, N. Y.
BEAUCHEMIN, Alphonse O.—M, Memphis, Tenn.
BELKNAP, Ethelbert Jr.—AM, Wilmington, Del.
BENNETT, Arthur F.—AM, Cincinnati, Ohio.
BERGSTROM, Adolf G.—AM, Cleveland, Ohio.
BERKLEY, William E.—J, Dripping Springs, Tex.
BERRY, Edward L.—J, Chicago, Ill.
BETTERTON, Herbert—AM, Camden, N. J.
BEWLEY, Wm. E.—AM, New York, N. Y.
BEYER, Benj. W. Jr.—J, Cincinnati, Ohio.
BIANCARDI, Joseph F.—J, New York, N. Y.
BINZEGGER, Victor—AM, St. Louis, Mo.
BLACKBURN, Godfrey C.—J, Detroit, Mich.
BLACKWELL, Hubert C.—M, Kansas City, Mo.
BODWELL, Clarence P.—A, West Roxbury, Mass.
BOLLING, Bartlett Jr.—M, Charlotte, S. C.
BOLTWOOD, Harvey—AM, Washington, D. C.
BOLZERL, Hiram A.—M, Pittsburg, Kan.
BOOTH, George E.—J, Toronto, Ont., Can.
BORDZUK, Walter S.—AM, Brooklyn, N. Y.
BOWNE, Charles N.—J, Philadelphia, Pa.
BOYER, D. Edwin—M, Watertown, N. Y.
BRINLEY, Clarence C.—AM, New York, N. Y.
BRITTINGHAM, Thomas H.—J, Augusta, Ga.
BROMBACHER, Max H. C.—M, Palm Beach, Fla.
BROWN, Hugh S.—J, Elizabeth, N. J.
BROWN, Lee R.—AM, West Orange, N. J.
BROWN, Louis A., Jr.—J, Fort Worth, Tex.
BUCHANAN, David M.—J, New York, N. Y.
BURKE, Walter Smith—A, E. Chicago, Ind.
BURNHAM, Leland R.—AM, Pittsburgh, Pa.
BURTCHAELL, Arthur E.—M, San Francisco, Cal.

CALL, Leroy J.—M, Niagara Falls, N. Y.
CALLAGHAN, Joseph F.—AM, L. I. City, N. Y.
CAMPBELL, A. L.—M, Hutchinson, Kan.
CARLISLE, Chas. Arthur—AM, Santa Fe, N. M.
CARNEY, Daniel P.—J, Meriden, Conn.
CARPENTER, Howard D.—M, Lititz, Pa.
CARROLL, Frank V.—M, Youngston, Ohio
CARTZAFNER, R. E.—M, Hamilton, Ont., Can.
CARULLA, Robert—J, Philadelphia, Pa.
CASBERG, Carl H.—J, Rockford, Ill.
CASEY, Frank A.—A, Billerica, Mass.
CASSELDEN, Albert—J, Toronto, Ont., Can.
CHASE, Howard W.—J, Colfax, Wash.
CHEEK, Wm. C.—J, Buffalo, N. Y.
CLARKE, Eugene Caldwell—AM, Chambersburg, Pa.
CLYDE, J. Dennis—AM, Limon, Colo
COLLINS, Frank W.—M, Peru, S. A.
COOK, Archibald S.—M, Kenogami, Que., Can.
COOK, Robert G.—AM, Brooklyn, N. Y.
CORBETT, Herbert A.—J, Auburn, N. Y.
COULSON, Herbert M.—AM, Tulsa, Okla.
COVE, William H.—M, Grand Rapids, Mich.
CRAIG, Louis B.—M, Rock Island Arsenal, Ill.
CROCKETT, Robert B.—AM, Tulsa, Okla.
CROSS, Robert A.—AM, Rock Island, Ill.
CROWLEY, Henry J.—M, Philadelphia, Pa.
CROWLEY, Robert—J, New York, N. Y.
CUBBERLEY, Admariah H.—AM, Wilmington, Del.

DARLINGTON, Stephen P.—J, West Chester, Pa.
DAVIS, Frank Lapworth—J, Worcester, Mass.
DeMAY, John A.—J, Rankin, Pa.
DEVLIN, LeRoy—AM, Bangor, Wash.
DICKERSON, F. G.—M, Chicago, Ill.
DISSTON, William D.—J, Philadelphia, Pa.
DONLEY, Bartrum G.—M, Clintonville, Wis.
DORIA, L. de P.—AM, Havana, Cuba.
DOWNE, Hamilton B.—AM, New York, N. Y.
DRANGE, Carl E.—AM, Plainfield, N. J.
DUNGAN, Donald K.—J, San Jose, Cal.

ECKLER, Harry—J, Ilion, N. Y.
EDWARDS, William H.—J, New York, N. Y.
EIGENBROT, John L.—M, Evanston, Ill.
ELSMAN, John G.—J, New York, N. Y.
ERNST, Frank A.—AM, Washington, D. C.
EVERETT, Arthur C.—AM, Roxbury, Mass.
EYCHENE, Paul—M, New York, N. Y.

FARRELLY, Bernard F.—J, New York, N. Y.
FAVORITE, Richard J.—AM, Gorton, Conn.
FERGUSON, Harry—AM, Allentown, Pa.
FERGUSON, Louis Aloysius, Jr.—AM, Providence, R. I.
FETHERSTON, Maurice F.—J, Jersey City, N. J.
FIELD, Oliver C.—AM, San Francisco, Cal.
FIELDING, William A.—J, Newburgh, N. Y.
FISHER, Harry L.—J, New York, N. Y.
FOLEY, Robert H.—AM, New York, N. Y.
FORBATH, Elmer F.—AM, Detroit, Mich.
FOREMAN, Ira—J, Mexico City, Mex.
FORSYTHE, William R.—AM, New York, N. Y.
FOSTER, Louis A.—AM, St. Louis, Mo.
FRAZIER, William W.—M, Chicago, Ill.
FREETHY, George E.—AM, Boston, Mass.
GALLAGHER, John S.—AM, Port Arthur, Tex.
GARMEY, C. Ronald—J, New Brunswick, N. J.
GEISSE, J. H.—AM, Paterson, N. J.
GENGENBACH, Wm. A.—AM, Rochester, N. Y.
GENZLINGER, Fred M.—AM, New York, N. Y.
GIER, Frank G., Jr.—J, Baltimore, Md.
GLASS, John B.—M, Chickasaw, Ala.
GOODWIN, Harold L.—J, Brookline, Mass.
GOULD, Joseph H., Jr.—J, Boston, Mass.
GREEN, Ben. H.—AM, Olean, N. Y.
GREENE, Elliott—M, Boston, Mass.
GRIEB, John J.—M, Carthage, N. Y.
GRIMM, Adolph—AM, Brooklyn, N. Y.
GRIMSHAW, William F.—J, New York, N. Y.

HAGUE, Harold O.—AM, Chicago, Ill.
HAILE, Wm. A.—AM, Rio de Janeiro, Brazil, S. A.
HALL, Lester C.—J, New York, N. Y.
HALL, Thomas W.—J, Chicago, Ill.
HARPER, Fred C.—J, Portland, Me.
HARTER, Paul W.—J, Alton, Ill.
HASKELL, John Dennis—J, Fulton, N. Y.
HAWKE, M. R.—AM, Akron, Ohio.
HENDERSON, James P.—AM, Chicago, Ill.
HENDRIE, Charles F.—J, Harrison, N. J.
HENNESSEY, John W.—J, Buffalo, N. Y.
HENNINGER, William A. P.—J, New York, N. Y.
HERZSCH, Frederic H.—M, New York, N. Y.
HESS, Frank J.—J, Bayonne, N. J.
HILL, Ray C.—AM, Sheboygan Falls, Wis.
HOLBERT, Edward O.—AM, West Orange, N. J.
HOLMES, V. Frank—M, Boston, Mass.
HOUSE, Leonard A.—AM, Boston, Mass.
HOUSLEY, Thomas P.—J, Brooklyn, N. Y.
HOWARD, Wm. J.—J, Durham, N. C.
HUANG, Shu-Pei—J, New York, N. Y.
HUDDLESTON, Robert Edward—AM, Fond du Lac, Wis.
HULL, Maynard V.—J, Nanchang, Ki, China.
HUNT, Wm. G.—AM, Chicago, Ill.
HUNTER, William—AM, Worcester, Mass.
HUNTING, George M.—AM, Cleveland, Ohio
HUSBAND, Robert M.—AM, Cario, Ill.

JACOB, Frank—J, Port Newark, N. J.
JAMIESON, Robert I.—A, Providence, R. I.
JENKINS, Peter—M, New York, N. Y.
JENSEN, Kenneth—J, Chicago, Ill.
JOWETT, Edwin—M, Kansas City, Mo.

KAREL, Frederick—AM, Washington, D. C.
KAY, Frank W.—AM, Philadelphia, Pa.
KAY, George A.—J, Toledo, Ohio.
KERR, S. Logan—J, Philadelphia, Pa.
KILBY, Clarence E.—M, New York, N. Y.
KIMER, H. A.—M, New York, N. Y.
KING, Marvin E.—M, Philadelphia, Pa.
KLEIN, E. E.—AM, Milwaukee, Wis.
KNOCKE, Louis T.—AM, Sheboygan Falls, Wis.
KNUDSTAD, Amos L.—AM, Milwaukee, Wis.
KOWBIG, Adolf H., Jr.—AM, Los Angeles, Cal.
KRAEHENBUEHL, John C.—J, Knoxville, Tenn.
KROESCHELL, Roy S.—J, Chicago, Ill.
KUEMMERLEIN, E. M.—J, Wellsville, N. Y.

LANE, Robert S.—J, New York, N. Y.
LAREW, I. Lee—AM, Beacon, N. Y.
LASSALIE, Leo Joseph—M, Baton Rouge, La.
LAUER, Stewart E.—AM, St. Louis, Mo.
LAWLER, Frank P.—AM, San Francisco, Cal.
LAWNIN, Nelson—J, Noblesville, Ind.
LAWRENCE, Almon R.—M, Boston, Mass.
LeBLANC, A.—A, New York, N. Y.
LEE, Robert J.—J, New York, N. Y.
LIGGETT, William K.—M, Columbus, Ohio
LINDEN, Carl E.—AM, Cincinnati, Ohio
LOCKWOOD, Robert W.—AM, Brooklyn, N. Y.
LOHBILLER, Harry John—M, St. Louis, Mo.
LOONEY, Earl A.—J, Cleveland, Ohio.
LORD, Charles R.—AM, New York, N. Y.
LOWNES, N. Thayer—AM, Philadelphia, Pa.
LUIGGI, Mario L.—AM, Rome, Italy.
LUKENS, Thompson H.—AM, Philadelphia, Pa.
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LYNN, John M.—J, Portsmouth, Ohio.

McBRYDE, Warren H.—M, San Francisco, Cal.
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McGAHEY, Robert E.—AM, Alexandria, Va.
McGINTY, Neal Lester—AM, San Francisco, Cal.
McINTYRE, Frederick W.—A, Worcester, Mass.
McKAY, Neil H.—M, Los Angeles, Cal.
McKINLEY, Carl St. C.—M, Muskogee, Okla.
McLAIN, Robert Henry—M, Schenectady, N. Y.
McNEAL, W. R.—M, Seattle, Wash.
MacGREGOR, Willard H.—M, New York, N. Y.
MACHOLL, Edward—AM, Detroit, Mich.
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MacNUTT, Homer—M, San Diego, Cal.
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MADSEN, Carl F.—J, San Rafael, Cal.
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MALTHANER, William—M, Cincinnati, Ohio.
MARLEY, James J.—AM, Hopewell, Va.
MARTIN, Charles R.—M, Milwaukee, Wis.
MARTIUS, Frederick Traugott—M, Chicago, Ill.
MASON, Robert E.—J, New Haven, Conn.
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MERRIFIELD, J. D.—AM, Erie, Pa.
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MEYER, Gustav E.—AM, Boston, Mass.
MEYERS, Arthur C.—M, St. Louis, Mo.
MIKLE, Clinton O.—M, Portland, Ore.

MOFFAT, FRASER M.—J, Irvington, N. J.
MOLER, ARLINGTON G.—AM, Chicago, Ill.
MOORE, CHARLES EDWARD—AM, Los Angeles, Cal.
MORE, WM. S.—J, Bethlehem, Pa.

NANGLE, CHARLES J.—J, East Cambridge, Mass.
NAVILLE, CONSTANTIN—J, Vernier near Geneva, Switzerland.
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OGIER, WALTER W., JR.—J, Pasadena, Cal.
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PETERSON, IRA E.—AM, Jersey City, N. J.
PIGGINS, EDWIN—AM, Orange, N. J.
POLKOSNIK, B. LEONARD—J, Waterbury, Conn.
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POWERS, FELIX W.—AM, Los Angeles, Cal.
PRESCOTT, CURRY S.—M, Menominee, Mich.
PRICE, GEORGE E., JR.—AM, Benton Harbor, Mich.

RANDOLPH, CLIFFORD F.—AM, Plainfield, N. J.
RASCHE, W. H.—M, Blacksburg, Va.
RAZEK, JOSEPH—J, St. Louis, Mo.
REDMOND, CLIFTON G.—AM, Brooklyn, N. Y.
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REID, JOHN—M, New York, N. Y.
RENDALL, HAROLD G.—AM, Dayton, Ohio.
RIDLEY, ROBERT D.—AM, St. Louis, Mo.
RIKER, MALCOLM D.—M, Dover, N. J.
RILEY, FRANCIS H. M.—AM, Milwaukee, Wis.
ROBE, GEORGE A.—J, New York, N. Y.
ROBINSON, ERNEST—M, Hartford, Conn.
ROBINSON, OTTO LOUIS—AM, Chicago, Ill.
ROSE, REED A.—J, Lynn, Mass.
ROSE, WALTER E.—J, Hawthorne, Ill.
ROSEN, NAHUM J.—J, Brooklyn, N. Y.
ROWE, JOSEPH E.—M, Williamsburg, Va.
ROYS, FRANCIS W.—M, Worcester, Mass.
ROYS, LAWRENCE—M, Moline, Ill.
RUSSELL, EDGAR S.—J, Campello, Mass.
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STEVENS, O. N.—M, Hutchinson, Kan.
STILES, H. G.—AM, Chicago, Ill.
STINSMAN, WALTER F.—J, New York, N. Y.
STOECKER, OTTO C.—AM, New York, N. Y.
STOUT, LLOYD M.—AM, Philadelphia, Pa.
STOWARD, WILLIAM HENRY—M, Rudaberg, Queensland, Australia.
SULLIVAN, EDWARD J.—J, Brooklyn, N. Y.
SUTTELLE, VICTOR P.—AM, Charleston, W. Va.

TAFFANEL, JACQUES—M, Montlucon, Allier, France.
TANNER, INOS B.—M, Chicago, Ill.
TAYLOR, IRVING A.—M, Worcester, Mass.
THOMA, FRED F.—AM, New York, N. Y.
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THOMPSON, GEORGE F.—AM, Philadelphia, Pa.
THOMSON, JAMES—M, East Chicago, Ind.
THORPE, CLAUDE—AM, Medicine Lodge, Kan.
TIMPSON, THOMAS W.—J, La Paz, S. A.
TOLPUTT, HERBERT—AM, Sheffield, Eng.
TORRENS, ROBERT J.—AM, Washington, D. C.
TRBOJEVICH, NIKOLA—AM, Detroit, Mich.
TRE. OUTHICK, STANLEY G.—J, New York, N. Y.
TULEY, CHARLES B.—J, Philadelphia, Pa.
TUNNADINE, JOHN—M, Toronto, Ont., Can.

VOELKER, ALBERT A.—M, Oxnard, Cal.
VREELAND, JOHN W.—J, Jersey City, N. J.

WALTERS, JEROME J.—J, New York, N. Y.
WALWORTH, ARTHUR C., JR.—M, Boston, Mass.
WEARN, G. E.—M, Baltimore, Md.
WEEKS, CHARLES R.—AM, Houston, Tex.
WEIDMAN, WM. R.—M, Cleveland, Ohio.
WEISEL, CHARLES H.—AM, New York, N. Y.
WEISZ, MARTIN—J, New York, N. Y.
WELLINGTON, CYRUS W.—AM, Toronto, Ont., Can.
WENTWORTH, HARRY A.—M, East Walpole, Mass.
WENTZEL, FRANK, JR.—J, Pittsburgh, Pa.
WHALEY, WILLIAM—M, Knoxville, Tenn.
WHEELER, VERNON L.—J, Elyria, Ohio.
WHITESIDE, JOHN WALTER—M, Clifton Forge, Va.
WICKS, CLIFFORD P.—AM, Bridgeport, Conn.
WILAON, CLYDE E.—M, Ann Arbor, Mich.
WILAON, E. J.—AM, Albany, N. Y.
WILAON, JOHN GILMORE—J, Devault, Pa.
WILDERMANN, RUDOLF F. M.—J, New York, N. Y.
WINSLOW, ARTHUR MELVIN—AM, Seattle, Wash.
WOLLE, GEORGE H.—M, New York, N. Y.
WOOD, HAROLD B.—M, New York, N. Y.
WURSTER, WILLIAM F.—AM, Beacon, N. Y.

ZIMMERMAN, ROBERT D.—J, Phillipsburg, N. J.

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POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

WANTED: Consulting engineers experienced in building design as sales representatives in following cities: Dayton, Columbus, Cincinnati, San Francisco, Los Angeles, Spokane, Seattle, Takoma, Toledo, Buffalo, Rochester, Atlanta, Denver, Salt Lake City, Montreal and Toronto. Work does not require large amount of time but men of very best calibre are absolutely essential. The sales representative must be in close touch with building situation in his territory. Sales experience not as important as ability to think straight. Each territory offers splendid opportunity for right man. X-1015.

SALES ENGINEERS, preferably with some sales experience, willing to work at present time on straight commission basis, selling motors, generators, fans, blowers, and commutators slotters and stones. Location New York City. X-1013.

SALES ENGINEER for metropolitan district to handle die castings and general mechanical parts, also mechanical leathers. Commission basis. Location New York City. X-1030.

SALESMAN experienced with heating and plumbing supplies such as radiators, boilers, pipe fittings, etc. Must know New York City trade. Application by letter. Location Long Island, N. Y. X-1055.

ENGINEER for sales or executive work for company manufacturing stainless cutlery. To become actively associated and take financial interest. Plant is equipped with most modern machinery available. Methods are efficient. Customers at present divided between hardware, department and house-furnishing stores, hotel and hardware jobbers. Location New Jersey. X-1057.

MECHANICAL OR INDUSTRIAL ENGINEER, able to take financial interest in small but profitable manufacturing business. Able to take complete charge, relieving owners from details of management. Location New York and Philadelphia. X-1065.

SALES ENGINEER to sell light concrete product to builders. Commission basis. Location New York City. X-1067.

AUTO MECHANICS, technically trained man with good practical experience wanted as instructor in vocational school in large city in middle west. Good position for competent man. State qualifications fully, including experience, schooling, age, and salary expected. X-1074.

INSTRUCTOR in marine engineering and naval architecture. Location California. X-1085.

YOUNG ENGINEERS not over 35 years of age for training to handle electrical and mechanical problems of erection and electrical testing in connection with telephone development in New York City. Location New York City. X-1087.

SHOP SUPERINTENDENT. Practical, mechanical engineer, not afraid to work. Must be able to set up tools for Cleveland automatic machine, 4 spindle automatic, understand Farrell gear hubbers, multiple spindle drills, Becker milling machines, etc. Must be an expert die and tool maker. Will be in charge of entire plant and supervise, not only manufacturing, but also shipping and factory office. Must be able to buy his own raw material and make his own estimates. Will have assistance of a draftsman. Knowledge of hardening material, as well as electro-galvanizing is important. Must be conscientious, reliable and trustworthy. Only men with similar experience may apply for this position. Application should give complete personal history and experience. Location New York. X-1089.

ENGINEER with practical experience in drop forging, making of dies, handling machine shop, heat treating and shipping; able to estimate costs of dies, forgings and carry on business management of plant. Location Canada. X-1093.

SALES MANAGER for company manufactur refrigerating machinery. Refrigeration experie not necessary. Man with pep and good personali Will be on road for year. X-1094.

SALES ENGINEER for company selling pipes, valves, fittings and steam specialties. Must have sales experience. Location New York City. X-1096.

GRADUATE MECHANICAL ENGINEER, 1920 and 1921, with erecting and installing experience if possible for company manufacturing chlorine control apparatus for water, sewage, bleaching, textile and paper mills. Will be given training course. Location New Jersey. X-1098.

DESIGNER for concrete mixers. Experience in this work essential. Location Pa. X-1104

SALESMEN to sell concrete mixers and similar contractors equipment. Also gasoline-engine experience desirable; will consider salesman with gasoline engine experience only. Location New York City. X-1105.

SALESMEN with practical engineering experience, who have sold technical product. Must have road experience. Two men needed. One for New England and one for local territory. Also two for western territory. X-1107.

DETAIL DRAFTSMAN. Particularly interested in securing services of young man technically trained, with 2 or 3 years' drafting experience. Personality that would fit him to later take position as sales engineer. Location Pennsylvania. X-1108.

MACHINE TOOL DESIGNER on medium weight, high-grade metal cutting machinery; able to design complete set of tools for manufacturing same. Must be thoroughly capable man with at least 5 years' practical experience. Furnish details as to experience, references, etc. Apply by letter. Location Mass. X-1117.

CHIEF ENGINEER'S ASSISTANT in plant manufacturing fine quality metal-cutting tools and gages. Applicant must be capable of handling large amount, small details in drafting room and able to work into

position of chief draftsman. Give details as to education, experience, references age, etc. in first letter. Location Mass. X-1118.

SALESMAN with stoker and superheater experience. Location New York City and New York State. X-1131.

SALES ENGINEER to sell compressors and vacuum pumps in chemical and affiliated industries. Must be graduate mechanical or chemical engineer versed in both lines, and must have had some sales experience. Location New York City. X-1136.

MECHANICAL DRAFTSMAN with general machinery experience preferably on centrifugal pumps. Must be experienced draftsman. Apply by letter giving age, education, experience, and salary expected. Location New Jersey. X-1145.

CHIEF DRAFTSMAN to supervise making up of practical manufacturing drawings, preferably one with shop experience. Location Pa. X-1147.

ENGINEER conversant with collapsible-tube manufacture from bottom up, and with executive ability for management and control. Requirements would be thorough knowledge of soft metal casting, extrusion process of extruding soft metals, metal decorating, and elementary mechanical engineering. Knowledge of domestic and foreign practices in manufacture of metallic collapsible tubes an asset. No vacancy at present time, but increased business will demand man of type outlined. Location East. X-1149.

GRADUATE ENGINEER of reputable technical college. Must have had one or two years' practical experience in shipyard, and experience in engine department on vessel. Age between 25 and 35 years. Location Pa., Del. X-1150.

FOREMAN in manufacturing department for operation of lathes, milling machinery, planers and boring mills. Experienced men only considered. Location New York City. X-1156.

ENGINEER experienced in operating fleet of motor trucks. Special experience in cost of operation, handling of packages, etc. Location New York City. X-1159.

YOUNG MECHANICAL ENGINEERS that we may train in our particular lines of business, with view of eventually transferring them to following divisions, factory, comptroller, development, sales, where they would be best suited. At the present time desire to secure men capable of eventually taking charge of special business. Location Illinois. X-1162.

ASSEMBLY DEPARTMENT FOREMAN experienced in assembly and rebuilding of machine tools. Location New York. X-1163.

ENGINEERS well qualified to take full charge of office and warehouse, carrying well assorted stock of high-grade steel products. Very necessary that men be thoroughly trustworthy and well recommended. Must be experienced steel salesmen, as well as practical men, thoroughly familiar with modern methods of heat treating and qualified to act as demonstrators. Would be desirable if men understood conditions peculiar to Eastern markets. Outline in detail experiences and references, together with idea of salary or drawing account, rate of commission, length of contract, etc. Location, Far East, China, and Japan. X-1166.

SALES ENGINEER, to handle line of furnace specialties in Connecticut. Must be familiar with boiler and furnace maintenance and repair. Salary and commission. X-1167.

SALES ENGINEER for furnaces—boiler material, force draft and boiler equipment. Sales experience essential. X-1178.

MECHANICAL ENGINEER, manufacturer of metal devices, will consider engaging mechanical engineer of inventive ability and capable of determining mechanical value of inventions. Located in Middle West. Applicants must state age and qualifications, also salary expected. X-1179.

MEN AVAILABLE

The large number of requests to insert notices under this heading makes it necessary hereafter to limit the number of words in each notice to 20 so that as many members as possible may be accommodated.

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter; unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

SALES ENGINEER age 28, single, with practical experience desires position with plumbing-supply house in New York or Pennsylvania. Ability could be applied to other lines. SM-6788.

MEMBER with general experience in office, shop and field, specializing in power-plant and mill work; last 10 years checking Diesel-engine designs desires position. References. SM-6789.

PROFESSOR OF MECHANICAL ENGINEERING desires additional work in writing, teaching or engineering. Location New York City. SM-6790.

EXECUTIVE, age 34, versed in modern methods of manufacture, costs, etc.; 5 years' plant manager for large company, manufacturing cast-iron boilers and furnaces. Employed. SM-6791.

SALES ENGINEER acquainted with manufacturing trade, mechanical lines, in Ohio, Indiana, Michigan, and located in Detroit; wishes to connect with manufacturer desiring to cover automobile industry. SM-6792.

MECHANICAL ENGINEER, graduate Polytechnic 1911, ten years' experience in power-plant operation, shop management, administration, cost work. Installations, valuations. SM-6793.

DESIGNER, practical shopman, 12 years' experience designing equipment, handling conveying, routing, labor saving, psychology of worker; also machine design, compiling complete data. Salary commensurate. Age 35, married. SM-6794.

MECHANICAL ENGINEER and draftsman, age 28, Brooklyn Poly. graduate, 6 years' experience power plants of battleships, desires connection with consulting engineer or industrial organization. SM-6795.

PROCESS AND MANUFACTURING ENGINEER, technical and commercial education, tactful executive, 7 years' shop and 9 years' engineering experience, on small and medium products. SM-6796.

MARINE ENGINEER AND DRAFTSMAN, age 38; married; desires position with steamship company contemplating motorizing of vessels. Ten years' Diesel engine experience. SM-6797.

MECHANICAL ENGINEER, age 26; 5 years' experience in maintenance and power-plant work Desires position assistant to works manager or industrial engineer. SM-6798.

PRODUCTION MANAGER AND SUPERINTENDENT, Cornell M.E. Experienced in interchangeable manufacturing and Gantt methods of production control, storekeeping; time study, etc. SM-6799.

MECHANICAL ENGINEER, married, 10 years' experience general engineering; technical and mechanical instructor past two years manufacturing and vocational schools. Prefer location South. SM-6800.

MECHANICAL ENGINEER, M.E. Cornell; age 35, 12 years' general engineering experience including industrial plant, power plant and pulverized fuel equipment design and construction. $3600. SM-6801.

EXECUTIVE, Harvard graduate, training mechanical and electrical engineering; 6 years' Central Station industry; 5 years' charge paper mill; available for position either of these industries. SM-6802.

SHOP ENGINEER, experienced as executive, planning construction of 60 different machines, desires position as equipment engineer or machine designer. SM-6803.

PRODUCTION ENGINEER, 26, technical graduate, experience, plant-engineering and layout, time-study, estimating production costs, cost and production-control installation. Metropolitan district preferred. SM-6804.

TECHNICAL GRADUATE, age 30; 10 years' practical experience mechanical and business, desires connection assistant to works manager, chief inspector, or sales engineer. SM-6805.

MECHANICAL ENGINEER desires permanent position with sales department. Excellent European connections, familiarity with trade conditions. SM-6806.

MECHANICAL ENGINEER SUPERINTENDENT OR MANAGER, university graduate, 32, single, experienced hydraulic turbines, teaching, chemical manufacture, plant manager 1200 men, construction. SM-6807.

CHIEF ENGINEER OR EXECUTIVE. Boiler manufacture and general plant construction—riveted and welded. Age 29. Salary $6000. SM-6808.

FACTORY SUPERINTENDENT in manufacture of machinery. Modern means and ways and live experience in active management of factory branches. SM-6809.

DRAFTSMAN, Ranken trade school graduate, age 23; 5 years' experience in detail and layout work. I. C. S. student at present. Location St. Louis, Mo. SM-6810.

ENGINEER. Cornell graduate would like position as superintendent or assistant works manager; 10 years' mechanical experience. No absolute preference as to locality. SM-6811.

PLANT ENGINEER OR WORKS MANAGER, technical, American, 35, married, wide experience in charge construction, operation, maintenance metal and textile trades. $3600. SM-6812.

MECHANICAL ENGINEER AND POWER SUPERINTENDENT, 13 years' experience construction and operation of power plants, steam turbines, steam and electric distribution. Knowledge of Spanish. SM-6813.

ENGINEER, graduate M. E., age 33. Experience chiefly the development of industrial power plants. Desires position with manufacture burning large amount of fuel. SM-6814.

GRADUATE MECHANICAL ENGINEER, age 28, married; 7 years' experience in maintenance, operating and production work in machine shops and steel foundries; location preferred, Cleveland. SM-6815.

ASSISTANT TO INDUSTRIAL ENGINEER OR FACTORY MANAGER. Lehigh M. E. graduate, age 30. Foundry, patternshop and machinist (apprentice and journeyman) experience. SM-6816.

INDUSTRIAL ENGINEER, technical graduate, consulting experience wood and metal; at present employed as production manager phonograph factory, desires connection in live organization which will reward results and hard work. SM-6817.

MECHANICAL ENGINEER, age 43; 26 years' extensive engineering and manufacturing experience. Practical mechanic, successful in handling help. Technical education; desires position superintendent or chief inspector. SM-6818.

EXECUTIVE ENGINEER, M. I. T. '14. Desires immediate change in position with reliable Co. in Eastern U. S. Best references, with 8 years' experience. SM-6819.

INDUSTRIAL ENGINEER OR FACTORY MANAGER now available. Age 40, M.E. Cornell. 17 years' manufacturing and engineering experience in metal and wood. Salary reasonable. Location optional. References. SM-6820.

GRADUATE INDUSTRIAL ENGINEER, assistant works manager or factory and production manager. Age 29, single. Location East, Middle West or West. SM-6821.

MECHANICAL DRAFTSMAN, age 24, junior member, first-class work and highest references. Prefer location Cleveland, Ohio or vicinity. SM-6822.

MECHANICAL ENGINEER, university graduate, age 25, experience steam turbines, centrifugal pumps, steam economizing. Prefer chemical industry. English, German, French. Location immaterial. SM-6823.

EXECUTIVE, 29; 10 years' thorough experience designing, purchasing, manufacturing and business administration industrial plants manufacturing hoisting, mining, marine, paper-working, road-making machinery and cranes. Location anywhere. SM-6824.

EXECUTIVE MECHANICAL ENGINEER, 16 years' experience as designer, chief engineer, works manager and superintendent with large western jobbing plant, building engines, hoists, cranes, and special machinery, etc. Age 37, married. Technical graduate, highest references; will go anywhere. SM-6825.

GENERAL OR FACTORY MANAGER, 18 years' experience, mechanical and executive; specialty low costs and interchangeable parts. Can put pep into organization; get results. No experiment. Details on correspondence. SM-6826.

SALES ENGINEER, experienced, will represent manufacturer in Philadelphia and vicinity; will make small investment; salary and commission basis. SM-6827.

DIESEL AND OIL ENGINE DESIGNER, technical graduate, age 33, 7 years' experience with representative American Manufacturers of Diesel

and heavy oil engines as designer or chief draftsman. Location immaterial. SM-6828.

MANUFACTURING SUPERINTENDENT, graduate M.E., broad designing experience for interchangeable products; tools, automatic machinery, up-to-date production. New York City preferred. SM-6829.

ASSISTANT ENGINEER, 24, single; M.E. (evening) 3 years' machinist apprentice, marine-engine testing; 4 years' machine and power-plant design. SM-6830.

MECHANICAL AND POWER ENGINEER, age 30, technical graduate; 8 years' experience chemical manufacturing, machine shop, metallurgy, sugar engineering, industrial and power-plant practice, etc. Good executive. SM-6831.

VALUATION ENGINEER AND EXECUTIVE, an authority. Has directed valuation and manufacturing. Seeks position with industrial department of bank, trust company or engineering firm. SM-6832.

MECHANICAL ENGINEER. M.E. graduate; 12 year's teaching engineering subjects, shop practice, 5 year's designing, production layout engineering; 10 year's successful management manufacturing plants; 3 year's designing, laying out and installing large Gov'mt Ordnance plant. Now available for work where such experience would be of value. X-6833.

INDUSTRIAL ENGINEER, technical graduate, 8 years' experience, organizing, production control and industrial relations. A keen analytical mind, pleasant personality, and thorough executive; now employed, references. SM-6834.

DESIGNING ENGINEER, 18 years' experience, bridge shop, steel mill, maintenance, bridge and structural steel, by-product coke oven apparatus, steam-power plants, etc. Reasonable salary. SM-6835.

MECHANICAL ENGINEER, technical graduate, at present employed; 10 years' power plant and industrial experience. Design erection, test, and operation. Age 33. Location West Coast. SM-6836.

AUTOMOTIVE ENGINEER, graduate M.E., 6 years' experience in gasoline engines and cars, desires to connect with engine or automobile manufacturer. SM-6837.

DESIGNER ENGINEER, age 31; 13 years' experience wide field of engineering design, industrial and mechanical. Executive, sales or board position desired. Location immaterial; references. SM-6838.

GRADUATE MECHANICAL ENGINEER, 34, married. Qualified for development, design, construction, production; 12 years' experience chemical and gas apparatus, plants, furnaces, charge of drafting department. Philadelphia District preferred. SM-6839.

WORKS MANAGER, all-round practical training, experienced in shop methods, systems, routine. Proved ability to handle labor problems satisfactorily. SM-6840.

MECHANICAL ENGINEER, experienced mechanical design electric machinery, general machinery, stress calculations, organizing routine work. Salary about $3000. SM-6841.

MAINTENANCE SUPERINTENDENT, age 33, M.E. degree; experienced in maintaining and constructing miscellaneous equipment and power plant machinery. Available at once. SM-6842.

SALES ENGINEER, mechanical engineer, age 25, graduate Mass. Inst. of Tech. with four years' engineering experience desires connection with progressive concern offering future. SM-6843.

SALES ENGINEER, age 27; mechanical engineer; 7 years' designing and selling experience heating, ventilation power plant. Desires to connect with progressive firm of engineering equipment. SM-6844.

MECHANICAL ENGINEER with industrial and executive experience, familiar with modern methods of production, manufacturing, and organization, wishes responsible work with progressive organization. Prefer Eastern States or foreign service. SM-6845.

MECHANICAL ENGINEER AND EXECUTIVE, good technical education and 14 years' practical experience, desires position where ability and conscientious application to duties would be appreciated. SM-6846.

INDUSTRIAL ENGINEER, now electrical engineer of works with 4000 lamps, 1200 motors, 120 traveling cranes, 10 locomotive cranes, power plant with a.c. and d.c. equipments, etc. Age 34; salary $6000. SM-6847.

SALES ENGINEER, 13 years' experience in design, estimating and sales, elevating and conveying, power transmission machinery, mill and factory supplies. SM-6848.

ENGINEERING OR FACTORY EXECUTIVE, 24 years, shop, designer, chief and superintendent on automotives, machine tools, and tools. Practical mechanic and engineer. SM-6849.

WORKS MANAGER, journeyman machinist, technical graduate and is familiar with modern management methods, desires change; 15 years' experience. SM-6850.

ENGINEER, 29, married; 9 years' experience in mechanical field, industrial-plant layouts, drawings, construction, reports, power plants, equipment, maintenance. Wishes to locate in non-travelling executive managerial position. Salary $3000. SM-6851.

INDUSTRIAL ENGINEER trained with Taylor Engineers, graduate M. E., 12 years' experience metal working, printing, clothing, processing and packing bulk materials, desires permanent engagement. SM-6852.

YOUNG MECHANICAL MAN, spent years in preparation of education designed to put new life into plants not producing efficiently would like to demonstrate ideas. Especially interested sales engineering; student modern selling. SM-6853.

LUBRICATION SALES ENGINEER, experienced in the sale and testing of lubricating oils. Interested in either oil or mechanical equipment sales work. SM-6854.

PRODUCTION MANAGER, technical graduate, age 36, married; 15 years' manufacturing experience from machine shop to executive end. Modern methods with practical application. SM-6855.

TOOL DESIGNER, 6 years' experience in production tools and automatic machinery. Age 24. Desires permanent connection with future. Location East or Middle West. SM-6856.

MECHANICAL ENGINEER, graduate, age 33; 10 years' experience design, construction, installation; maintenance modern steam-power plants, refrigeration, industrial equipment desires connection power or plant engineer. Location East. SM-6857.

WORKS ENGINEER, technical graduate, 3 years with Diesel engine Co.; 6 years as master mechanic large carpet mill. SM-6858.

MECHANICAL EXECUTIVE, 18 years' experience in mechanical lines, also brass and iron foundries; have had charge of plants employing 100 to 1200 men; now on road as sales engineer. SM-6859.

MECHANICAL-ELECTRICAL ENGINEER, experienced on power generation and utilization, familiar with all phases of central-station work, available for industiral plant or electrical-utility company. SM-6860.

MEMBER, middle aged, wide experience in power-plant equipment, also buyer for export to Far East; unusually high-class references. SM-6861.

DEVELOPMENT AND PRODUCTION ENGINEER, 19 years in present position, small and medium high-grade interchangeable product. Highest reference from present employer. SM-6862.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER NOVEMBER 29, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically by states, then alphabetically. Unless objection is made to any of the candidates by Nov. 29, 1921 and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

McCONAGHY, L. S., Designer, George B. Rogers, Mobile

Arizona

BELL, HERMAN A., Designer, Miami Copper Co., Miami

Arkansas

EBERLE, JOHN P., Gardner Auto Co., Fort Smith

California

CREIGHTON, JOHN T., Superintendent Gas Manufacturer, Los Angeles Gas & Electric Corp., Los Angeles
ERNST, ROBERT J., Union Steam Pump Sales Co., Los Angeles
GREEN, RUSSELL H., Sales Engineer, Worthington Co., Inc., Los Angeles
HOLMAN, EARL L., Farmington
LEE, SMITH, Los Angeles
ROBINSON, FRED C., Mechanic, Southern Californian Edison Co., Big Creek
ROCKLIFF, WILLIAM A., Superintendent of Construction and Master Mechanic, American Trona Corp., Trona, San Bernardino Co.
TOURTELLOTTE, WESLEY B., President & General Manager, Apex Engineering Co., Inc., Los Angeles
WILLCOX, JOHN F., Redwood City

Connecticut

BIGELOW, LYFORD G., Plant Engineer, P. & F. Corbin Division, American Hardware Corp. New Britain
CARTWRIGHT, KENNETH, Assistant to Engineer of Tests, New York, New Haven & Hartford Railroad Co., New Haven
CLAUSSEN, EDWARD E., Mechanical Engineer, Hartford
HATCH, HENRY R., Jr., Lyme
PERRY, RUPERT C., Machine Designer, The Scovill Manufacturing Co., Waterbury
READ, JOHN H., Assistant Inspector of Engineering Material, United States Navy, Bureau of Steam Engineering, Hartford
RUNK, WILLIAM B., The Robert N. Bassett Co., Shelton
SCOVILLE, HENRY F., Bridgeport Branch, Remington Arms Co., Bridgeport
SHUK, JOHN J., Designer, Lake Torpedo Boat Co., Bridgeport
SPENCER, CHRISTOPHER M., Mechanical Engineer, New Britain Machine Co., Hartford
THIEME, OTTO, Factory Manager, Underwood Computing Machine Co., Hartford
WASHBURN, JOHN M., Assistant Engineer, Merrow Machine Co., Hartford
WATERHOUSE, HAROLD D., Stillman Shaw, Hartford

Delaware

BRADFORD, WILLIAM, Engineer, Edge Moor Iron Co., Edge Moor

District of Columbia

RHODES, LEWIS B., Sales Representative, Vapor Car Heating Co., Washington
SCHMIDT, LOUIS H., Washington

Florida

MAINEY, L. HUGH, Assistant Superintendent, A. Bentley & Sons Co., Jacksonville

Illinois

BATES, HARRY E., The Peoples Gas Light & Coke Co., Chicago
BIRD, HARLAN W., Sales Engineer, The Roto Co., Chicago
DeCELLE, O. A., Sales Manager, International Filter Co., Chicago
GRONEMEYER, HERBERT W., Mechanical Engineer, Laclede Steel Co., Alton
HARTNELL, CHARLES H., Chicago Adjuster, Home Insurance Co. of N. Y., Chicago
HEMB, HARALD B., Production Work, Liquid Carbonic Co., Chicago
MARSHALL, ALFRED, President, Marshall & Huschart Machinery Co., Chicago (Reinstatement)
NEWBERG, HAROLD O., Heating & Ventilating Engineer, Alfred Alschuler, Chicago
PERRY, ROBERT V., Armour Institute of Technology, Chicago
PROCHAZKA, HENRY C., Universal Oil Products Co., Wood River
QUINLAN, FRANK D., Cadet Engineer, Peoples Gas Light & Coke Co., Chicago
ROBINSON, HOWARD L., Tool Designer, Union Special Machine Co., Chicago
SCHALLER, WILLIAM F., Business and Production Manager, O. E. Szekely Co., Moline
SHUMWAY, NOBLE C., Jr., Union Special Machine Co., Chicago
WAGNER, ARTHUR J., Mechanical Draftsman,

Ordnance Department, United States Army, Rock Island Arsenal, Rock Island
WEBSTER, Sheldon H., Van Dorn Coupler Co., Chicago

Indiana

DRYSDALE, George A., Metallurgical Engineer, Midwest Engine Co., Indianapolis
MUMMA, Levi B., Student, Purdue University, La Fayette

Iowa

STRAWN, Marion L., Chief Engineer, Omnigraph Co., Des Moines

Kansas

WHITEHEAD, Edgar, Jr., Chemist and Assistant Superintendent, Empire Gasoline Co., Arkansas City

Louisiana

GLASS, HARRY J., Fairbanks Morse & Co., New Orleans
HAAS, D. Marshall, Student, Traffic Department, Cumberland T. & T. Co., New Orleans
POTTHARST, J. E., Sales Engineer, Fairbanks Morse & Co., New Orleans
STONER, Robert G., Chief Engineer, Caddo Central Oil and Refining Corp., Shreveport

Maryland

WHITEHOUSE, Frank, Assistant Superintendent of Equipment, The American Sugar Refining Co., Baltimore

Massachusetts

BLACK, Charles F., Production Manager, Osgood Bradley Car Co., Worcester
CLARKSON, Ernest D., Waltham
COLLINS, Ernest J., Assistant Manager, Boiler & Engine Department, Travelers Indemnity Co. Worcester
CUMNER, Robert L., Member of Engineering Staff, Scovell, Wellington & Co., Boston
DETTLOFF, Adolph M., General Electric Co., West Lynn
DINAN, Henry F., Chief Draftsman, American Optical Co., Southbridge
EAMES, David D., Head of Steam Engineering Department, Lockwood, Greene & Co., Boston
HALES, Charles A., Draftsman, Bethlehem Shipbuilding Corp., Quincy
KINIRY, John B., Boston Navy Yard, Boston
LAMSON, Arthur W., Vice-President & Factory Manager, Wico Electric Co., Springfield
MASON, Earl M., Assistant Production Manager, Morgan Construction Co., Worcester
MAXWELL, Morrill Y., Assistant to Maintenance Engineer, General Electric Co., West Lynn
PRAETZ, Edward F., General Electric Co., West Lynn
PRYCE-BROWN, Gillson R., Assistant to Production Engineer, Belcher & Taylor A. T. Co. Chicopee Falls
RAYMOND, Fairfield E., Assistant Works Engineer, Crosby Steam Gage & Valve Co., Boston
SANBORN, Clarence W., Lynn
SMITH, Clarendon W., Junior Accountant, George A. Smith & Co., Worcester
STORROW, James J., Jr., Technical Assistant, The Edison Electric Illuminating Co., Boston

Michigan

BOWER, Raymond G., Mechanical Draftsman, Burroughs Adding Machine Co., Detroit
GREIG, James P., Inspector, Bureau of Safety Engineering, Detroit
MALLOCH, Wesley F., Escanaba
MENKEE, Ernest D., Assistant Combustion Engineer, Consumers Power Co., Battle Creek
OFFER, Louis A., Mechanical Engineer, Ford Motor Co., Detroit
SANSI, Carl W., Mechanical Engineer, Gardner S. Williams, Ann Arbor
SMITH, Morgan B., Chemical Engineer, The Detroit Edison Co., Detroit
WICKSON, Leo W., Secretary and Production Engineer, Wright-Fisher Engineering Co., Detroit

Minnesota

DOBBS, Loyle D., Master Mechanic, Minneapolis Bedding Co., Minneapolis
HERRON, William L., Mechanical Engineer, Carbic Manufacturing Co., Duluth
RAETZ, Stephen J., Mechanical Engineer, Duluth Missabe & Northern Railway Co., Proctor

Missouri

NEUBAUER, Laurence J., Kansas City Power & Light Co., Kansas City

Nebraska

MORITZ, Harold K., Instructor, University of Nebraska, Lincoln
RAINEY, Hugh D., District Engineer, The Refinite Co., Omaha
WILKINSON, LeRoy J., Assistant Engineer, The Refinite Co., Omaha

New Hampshire

KINGSBURY, Edward J., Superintendent & Partner, Kingsbury Manufacturing Co., Keene

New Jersey

BOWERS, H. L., Chemical Engineer, J. L. Mott Co., Trenton
CHERRY, Arthur C., Cadet Engineer, Public Service Gas Co., Newark
CREEHOSKI, Joseph V., Engineer, Commonwealth Water Co., Summit
DARWENT, Warren J., Singer Manufacturing Co., Elizabethport
DAVIS, Arthur J., Chief Draftsman and Tool Designer, Zobell Electric Motor Corp., Garwood
EDLICH, Paul, Textile and Consulting Engineer, Delawanna
FYFE, James R., New York Shipbuilding Corp., Camden
HAEBERLEIN, Max, Hydraulic Engineer, Worthington Pump & Machine Co., Harrison
HOOPER, G. Herbert, Service Superintendent, The Roessler & Hasslacher Chemical Co., Perth Amboy
JEFFERIS, Bernard G., The Celluloid Co., Newark
LANKERING, Robert T., Secretary, Lankering Cigar Co., Patterson
McCASLIN, Herbert J., Instructor, W. L. Dickinson High School, Jersey City
MEAD, George J., Chief Engineer, Wright Aeronautical Corp., Patterson
MURPHY, Henry D., Jersey City
REESE, Francis I., Mechanical Engineer in charge, American Saw Mill Machine Co., Hackettstown
RICHARDS, Charles L., Machine Tool Designer, Niles Bement Pond Co., Plainfield
RITCHIE, Paul, Millville
SCHWARZ, Quirin J., Superintendent, United Cork Cos., Lyndhurst
SEAL, Alfred T., Draftsman, Niles Bement Pond Co., Plainfield
SMITH, Edward S., Chief Engineer, Aero Marine Co., Keyport
STRAETZ, Arthur G., Sales Engineer, American Gas Accumulator Co., Elizabeth
STREET, Edward T., Mechanical Superintendent, The Ruberoid Co., Bound Brook
TAVERNA, Frederick F., Instructor, Stevens Institute Technology, Hoboken
ULLRICH, August, Superintendent, Gould & Eberhardt, Newark
VOLLMAN, Joseph, Assistant Department Manager, Singer Manufacturing Co., Elizabeth
WARD, Raymond B., Sales Engineer, The Brunswick Refrigerating Co., New Brunswick
WILSON, Albert K., Industrial Engineer, Standard Oil Co., Elizabeth
ZUIDEMA, Albert, Cadet Engineer, Public Service Electric Co., Newark

New Mexico

RAMP, Oliver B., Head of Mechanical Engineering Department, State A. & M. College, Las Cruces

New York

ABBOTT, Harry L., Chief Engineer, The Abbott Engineering Co., New York Mills
ADAMS, Edward T., Mechanical Engineer, The Fairbanks Co., Binghamton
ARD, Ligon B., Lieutenant Commander, Fleet Naval Reserve, New York
AUSTIN, Harlowe A., Representative, Crane Co., Binghamton
BACKUS, Richard A., Chief Engineer, McKenzie, Voorhees & Gmelin, New York
BELFORT, Leonid A., New York
BROWN, Benjamin D., Chief Tool Designer, Ford Instrument Co., New York
CADZOW, Murray, Mechanical Draftsman and Engineer, Starrett & Van Vleck, New York
CAMPBELL, Acheson M., Resident Engineer, Meyer Morrison & Co., New York
CLARKE, Warren H., Sales Engineer, Hyatt Roller Bearing Co., New York
COLWAY, John F., Toolmaker, L. C. Smith & Bros., Syracuse
DANIEL, Charles E., J. F. Musselman, New York
EBDON, Hubert G., Estimator, Combustion Engineering Corp., New York
ECKERT, William S., Secretary, Copper & Brass Research Assn., New York
EVANS, Robert H., Chief Engineer, Barber Steamship Co., Brooklyn
FAULKNER, Dwight H., Engineer Salesman, H. B. Smith Co., New York
FULLER, Earl Du B., American Automobile Assn., New York
GOLDBERGER, Richard, Brooklyn
GREACEN, John L., Brooklyn
GRULICK, Francis K., Manager, Contract Department, Combustion Engineering Corp., New York
HARKER, Ferris P., Manhasset, L. I.
HEILES, Frederick C., Chief Engineer, Schwartz & Gross, New York
HOMANS, Thomas S., Head of Experimental Department, Intertype Corp., Brooklyn
JONES, Henry J., Assistant to Chief Engineer, New York Nursery & Child's Hospital, New York
KELSEY, George W., The Emerson Engineers, New York
KIMBALL, Leo B., Assistant Erecting Engineer, Shipley Construction & Supply Co., Brooklyn
KLEIN, Max, Assistant to Chief Draftsman, American Machine & Foundry Co., Brooklyn
McKERNAN, T. W., B. F. Sturtevant Co., New York
McKIERNAN, James D., Brooklyn Union Gas Co., Brooklyn
McKINLEY, Benjamin P., President & Treasurer, Hemce Electric & Manufacturing Co., New York
MEYER, Alfred, Brooklyn Union Gas Co., Brooklyn
MISCHE, Donald H., Chief Tool Designer, Ritter Dental Manufacturing Co., Rochester
MOORE, Joseph K., Sanderson & Porter, New York
MULLANEY, Frank P., H. L. Gantt Corp., New York
OPITZ, William H., The Julian Pump & Manufacturing Co., Jamestown
PADDOCK, Walter M., Instructor in Mechanical Engineering, Rensselaer Polytechnic Institute, Troy
PAULSEN, Edward H., Brooklyn
PIRNIE, James A., Brooklyn
REED, Hugh D., Apprentice, Eastman Kodak Co., Rochester
RODMAN, Sheldon L., H. W. Johns-Manville Co., New York
ROGERS, Fred A., Sanderson & Porter, New York
SCHATTEN, Louis E., Draftsman, Department Plant and Structures, New York
SCHROEDER, August C., Panama Railroad Steamship Line, New York
SPITZER, Joseph, Bronx
STEINMUELLER, Edward W., Gas Engineering and Sales Agency, New York
STIMSON, James P., Chief Engineer, Sanderson Bros. Works, Crucible Steel Co. of America, Syracuse
STRACHAN, George C., Assistant to Industrial Engineer, American Hard Rubber Co., College Point
TAPPAN, Chester, Mechanical Engineer, Western Electric Co., New York
THUEM, A., M. W. Kellogg Co., New York
TOLLEFSON, Mathias, Supervising Engineer, Ocean Accident and Guarantee Corp., Ltd., New York
WHITNEY, H. Le Roy, Director and Sales Engineer, M. W. Kellogg Co., New York
WILLARD, Waldo W., General Electric Co., Schenectady
WINSLOW, Pearson, Industrial Department, Bonbright & Co., New York
WYATT, G. B., Mechanical Engineer, Charles E. Campbell, Inc. Elmhurst, Long Island
YOUNGSON, Alexander C., Engineer's Assistant, Starrett & Van Vleck, New York

Ohio

BARTELS, Carl, Works Manager, Mosler Safe Co., Hamilton
BARTLETT, Malcolm B., Toledo Scale Co. Toledo
DRURY, Alexander G., Engineer, Newport & Covington L. & T. Co., Cincinnati
EISELE, Herbert W., Assistant Superintendent, American Multigraph Co., Cleveland
GROVE, Roy H., Chief Engineer, The Falcon Steel Co., Niles
HARTMANN, Carl, The Lunkenheimer Co., Cincinnati
HASKIN, George W., Engineer and Flier, Engineering Division, Air Service, Dayton
LAWSON, Sherman S., Estimating Engineer, Lima Locomotive Works, Lima
NUTTING, Paul J., Engineer, Henry L. Doherty & Co., Toledo
RANDALL, Norman, Designing Engineer, Cleveland Twist Drill Co., Cleveland
VOGES, Herman, Jr., Director, The Webster & Parks Tool Co., Springfield

Oklahoma

BIGNELL, Leonard G. E., Sales Engineer, The Parkersburg Rig & Reel Co., Tulsa
WILLITS, James E., Proprietor, James E. Willits, Tulsa

Pennsylvania

CASKEY, SAMUEL S., Philadelphia
CLARKE, ARVINE N., Susquehanna Collieries, Wilkes-Barre
DECKER, CURTIS D., Westinghouse Electric & Manufacturing Co., South Philadelphia
DRIGGS, LORENZO J., Penn Public Service Corp., Johnstown
EDMONDS, EUGENE A., Carbondale Machine Co., Carbondale
FORD, TERRANCE J., Assistant Inspector of Ordnance, United States Navy, Bethlehem
FRAZIER, CHAUNCEY E., President, Simplex Engineering Co., Washington
FREAR, HUGO P., Naval Architect, Bethlehem Shipbuilding Corp., Ltd., Bethlehem
GILL, FRANKLIN V., Instructor, Reading School District, Reading
HARTSHORN, DEFICK S., Industrial Engineer, Williamsport
KINYON, ALONZO G., Manager, Conveying Department, Fuller-Lehigh Co., Fullerton
LEWIS, JOSEPH F., Assistant to Manager, Pringle Electric Manufacturing Co., Philadelphia
MacNAMARA, MATTHEW J., Works Manager, The S. S. White Dental Manufacturing Co., Philadelphia
MARSLAND, ROLAND, Steam Turbine Designer, Westinghouse Electric & Manufacturing Co., South Philadelphia
MARTWICK, W. LORIMER, Pennsylvania Crusher Co., Philadelphia
MOREHOUSE, JULIUS S., Villa Nova College, Villa Nova
MORTON, JAMES A., Assistant Mechanical Engineer, American Steel & Wire Co., Pittsburgh
MULLEN, LEO F., Westinghouse Electric & Manufacturing Co., East Pittsburgh
NEWLIN, HENRY S., Superintendent, The Rotter Speer Co., Sharon
PERCIVAL, GEORGE J., Salesman, Silumite Products Corp., Philadelphia
SULLIVAN, JOSEPH J., Westinghouse Electric & Manufacturing Co., South Philadelphia
WARD, GEORGE B., Senior Estimator, United States Shipbuilding Emergency Fleet Corp., Philadelphia
WHERLEY, CLARENCE V., Draftsman, American Bridge Co., Ambridge

Rhode Island

LLOYD, LEON A., Maplewood
PLAYER, SYDNEY, Production Manager, Taft-Pierce Co., Woonsocket
STRATTON, JULIAN A., Mechanical Draftsman, United States Naval Training Station, Newport

Tennessee

ELLIS, SAMUEL J., Jr., Superintendent, Vulcan Iron Works, Memphis
KRAEHENBUEHL, A. O., Mechanical Draftsman, Enterprise Foundry & Machine Works, Bristol
MARCOTTE, ARTHUR D., General Factory Foreman & Production Engineer, Layne & Bowler Co., Memphis

Texas

BAILEY, A. S., Chief Engineer, The Texas Co., Port Arthur
DAVENPORT, WILLIAM C., Erecting Engineer, Construction Department, General Electric Co., Dallas
DOE, ALBION N., Head of Shop Department, University of Texas, Austin
DURKEE, CHARLES C., Superintendent, White Eagle Oil & Refining Co., Fort Worth
MOODY, WILLIAM, Superintendent of Apprentice School, M. K. & T. Railroad, Denison
ROSS, JAMES H., Freeport Sulphur Co., Freeport
THOMPSON, HARRY E., Daugherty

Virginia

CRAFTON, H. HERBERT, Richmond
FRANKUM, JOSEPH B., Millwright Helper, Hummel-Ross Fibre Corp., Hopewell
HANKINS, CYRUS, Newport News Shipbuilding & Dry Dock Co., Newport News

Washington

DILLMAN, ROBERT, Factory Superintendent, Libby McNeill & Libby, Kent
MORAN, JOHN M., Manager, Moran Manufacturing Co., Seattle
QUACKENBUSH, CLAUDE F., Quackenbush Warehouse Co., Bellingham

Wisconsin

JUNEAU, CHARLES G., Master Car Builder, Chicago, Milwaukee & St. Paul Railway Co., Milwaukee
NELSON, WILLIAM A., Efficiency Engineer, Giddings & Lewis Machine Tool Co., Fond du Lac
SCHRANK, EDWARD, Steam Engineer, Consolidated Water Power & Paper Co., Wisconsin Rapids

Canada

ARSENAULT, ROMEO, Draftsman, St. Maurice Paper Co., Cap Madeleine, Quebec
BILLINGS, WALTER E., Chief Engineer, W. J. Westaway Co., Hamilton, Ont.
DELISLE, JOSEPH L., Master Mechanic, La Cie de Pulpe de Chicoutimi, Chicoutime, Quebec
DICKEY, FORREST C., Assistant Manager, Blue Bird Corp., Ltd., Brantford
ELLIS, FRED. J., Abitibi Power & Paper Co., Iroquois Falls, Ont.
HOLGATE, HENRY, Consulting Engineer, Montreal, Que.

Cuba

MAJOR, WILLIAM R., Chief Mechanical Engineer, United Railways of Havana, Havana
SMITH, WALKER, Superintendent of Manufacture, New Niquero Sugar Co., Niquero

Denmark

BERGGREEN, PAUL H., Foreign Sales Manager, Reck Heating Co., Ltd., Copenhagen

India

DUTT, P. C., Inspector of Government Boiler & Steam Plants, Assam
JOHNSON, LAWRENCE, Works Manager, Agricultural Implements Co., Ltd., Jamshedpur
LELE, RAMCHANDRA N., Assistant Foreman of New Machine Shop, Tate Iron & Steel Co., Ltd., Jamshedpur
PANCHANADAM, AYYAR R., Supervisor, Madras Public Works Department, Trichinopoly

Japan

SHIMA, YASUDIRO, Director, The South Manchuria Railway Co., Dairen, South Manchuria

Mexico

ATWELL, CHARLES S., Chief Engineer, Refining and Pipeline Departments, The Texas Co., Tampico
LEACH, HARRY L., General Manager, Cia de Cemento Port Monterrey, Monterrey

South America

GAREY, GEORGE W., Master Mechanic, Chile Exploration Co., Chuquicamata, Chile
MILLER, ARNOLD H., General Mechanical Foreman, Chile Exploration Co., Chuquicamata, Chile

Sweden

FLATER, HAROLD, Manager, International Harvester Co., Norrkoping

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

New York

CLARK, WALLACE, Consulting Industrial Engineer New York

PROMOTION FROM ASSOCIATE-MEMBER

Connecticut

BENTLEY, JOSEPH H., Proprietor, Bentley & Holmgren, Bridgeport
WHITMAN, RAY B., Chief Patent & Trade Mark Attorney and Consulting Engineer, Columbia Graphophone Manufacturing Co., Bridgeport

Delaware

HOLT, J. HUNT, Atlas Powder Co., Wilmington

Illinois

BOSE, KUMUDINI K., Chicago
CLEVELAND, F. W., Equipment Engineer, Illinois Watch Co., Springfield

Massachusetts

SIMPSON, FREDERICK C., Designer in Mechanical Engineering, Lockwood, Greene & Co., Boston

Minnesota

WILLARD, JOHN A., General Superintendent, Bemis Bro. Bag Co., Minneapolis

New York

COLEMAN, J. EMILE, Consulting Engineer, New York
STANTON, ROBERT B., JR., Vacuum Oil Co., New York
TURNO, WALTER G. W., Engineer, D. R. Douglas & Co., New York

Ohio

ADAMS, EARL E., Chief Engineer, The Smith Gas Engineering Co., Dayton
REEVES, THOMAS W., Manager, The McNaull Boiler Manufacturing Co., Toledo

Pennsylvania

YOUNG, JOHN H., JR., District Lubrication Engineer, The Texas Co., Philadelphia

Canada

FOZARD, LEONARD G., Works Manager, The Marconi Wireless Telegraph Co. of Canada, Ltd., Montreal, Quebec
BOATE, GERALD A., Assistant Director of Technical Education for Nova Scotia, Nova Scotia Technical College, Halifax, Nova Scotia

PROMOTION FROM JUNIOR

California

POTTS, WILLIAM K., Assistant to Chief Engineer, Division of Architecture, Department of Public Works, Sacramento
PURINTON, JACOB W., Consulting Engineer, Los Angeles

District of Columbia

HEALD, ROYAL H., Associate Physicist, Bureau of Standards, Washington

Illinois

SEVERNS, WILLIAM H., Assistant Professor Mechanical Engineering, University of Illinois, Urbana

Maryland

PENNIMAN, ABBOTT L., JR., Superintendent Steam Stations, Consolidated Gas, Electric Light & Power Co. Baltimore

Massachusetts

SEARLE, WILBUR C., Assistant Superintendent Service Division, Reed & Prince Manufacturing Co., Worcester

Michigan

SEARS, HAROLD R., Structural Steel Draftsman, Kalamazoo Foundry & Machine Co., Kalamazoo
SEUTTER, LOUIS, Consulting Engineer, W. H. Coye, Grand Rapids

New Jersey

BOLLING, J. ESTEN, Publicity Engineer, Carrier Engineering Corp., Newark
FERGUSON, CHRISTIAN W., Secretary & Treasurer, Marvel Machine & Ornamental Iron Works, Inc., Jersey City
GAST, GEORGE F., Mechanical Superintendent, Tide Water Oil Co., Bayonne
HETZEL, ROLAND F., Chief Engineer & Assistant General Manager, Goetze Gasket & Packing Co., New Brunswick

New York

COHEN, EDGAR F., A. Eugene Michel & Staff, New York
GERBER, SAMUEL R., President, S. R. Gerber Co., New York
GRUPE, WILLIAM F., Engineer & Manager, Boucher Cork & Machine Co., New York
ISENBERG, MARTENS H., Manager, Erection & Service Departments, Combustion Engineering Corp., New York
VAN NESS, FRANK W., Frank W. Van Ness and Associates, (Reinstatement) New York
VRABEC, GUSTAV L., Mechanical Designer, Brooklyn Edison Co., Brooklyn

Ohio

ABERNETHY, ALFRED A., Mechanical Engineer & Designer, Brown Hoisting Co., Cleveland
RITTER, E. R., President, Hill & Griffith Co., Cincinnati

Pennsylvania

BRADFORD, LOUIS J., Assistant Professor in charge of Machine Design, Pennsylvania State College, State College
MOODY, WILLIAM M., Western Engineer, I. P. Morris Department, Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia

Wisconsin

RITTER, RALPH H., Mechanical Engineer, A. O. Smith Corp., Milwaukee
WEISS, ERWIN A., Assistant Engineer, Mitchell Motors Co., Inc., Racine

SUMMARY

New Applications	249
CHANGE OF GRADING:	
Promotion from Associate	1
Promotion from Associate-Member	15
Promotion from Junior	24
Total	289

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In Two Sections—Section Two

MECHANICAL ENGINEERING

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Vol. 43, No. 12 **A.S.M.E. AFFAIRS** **December, 1921**

14 SECTION OFFICERS WHO REPRESENT SEVEN GEOGRAPHICAL GROUPS

Photographs of Chairman and Secretary of One Local Section Within Each Group

Members of the Society generally will be interested in being introduced to the officers of the various Local Sections, therefore, in this issue of Mechanical Engineering there is being published a group of photographs of the Chairmen and Secretaries of seven groups of the country. Each of these seven groups is located in one of the Geographical Sections of the country from which representatives of the Regular Nominating Committee are chosen.

From Group No. 1, or the entire New England district, the Chairman and Secretary of the New Haven Branch of the Connecticut State Section have been selected. Mr. A. C. Jewett, who is Chairman, is the personnel superintendent of

A. C. JEWETT S. W. DUDLEY
GROUP NO. 1

W. S. FINLAY, JR. G. I. RHODES
GROUP NO. 2

the Winchester Repeating Arms Co. Professor S. W. Dudley, the Secretary, is an instructor of mechanical engineering at Yale University. He succeeded Professor E. H. Lockwood who served as Secretary of the New Haven Section and of the New Haven Branch respectively, for a period of ten years. Upon the completion of his term of service last summer, Professor Lockwood was presented with a gold watch, from the members of the Connecticut State Section, as a token of their esteem.

Group No. 2, is represented by the Chairman and Secretary of the Metropolitan Section, the largest Section in the country, with 3572 members

STUDENTS HAVE PROFESSIONAL SESSION AT ANNUAL MEETING

An innovation in the way of a professional session under the supervision of the members of student branches will be held for the first time at the Annual Meeting on Thursday, December 8, beginning at 9:00 a.m. The principal reason for arranging this session is to provide an opportunity for the students of engineering to meet with the members of the profession. Therefore, the success of the undertaking will depend largely upon the degree to which members of the Society respond by attending the meeting, thereby giving evidence to the embryo engineer of the interest of the Society and the desire to assist him along the path of engineering progress. We must remember that it is these young men who will comprise the membership of the Society in the next generation.

O. P. HOOD C. E. OAKES
GROUP NO. 3

J. B. DILLARD C. H. DAY
GROUP NO. 4

DAVID LOFTS J. D. CUNNINGHAM
GROUP NO 5

on November 1. It is larger in size than was the entire Society membership on January 1, 1909, when there were 3455 members. Mr. Walter S. Finlay Jr., who is the Chairman, is at present

(Continued on page 134)

LIVELY DISCUSSION IS PROMISED AT READING OF NEW CONSTITUTION

Local Sections, Standing Committees and Individual Members Evince Their Interest

President Carman is of the opinion that the interest which has been evinced in the new Constitution by the Local Sections, by the Standing Committees of the Society and by individual members who have taken the trouble to write out their views and send them in to the Society, will result in a very lively discussion when the new document is put before the Business Meeting at the Annual Meeting.

Everyone seems attracted by the obvious simplicity of the new document, but evidently the reduction of the number of words to about one-quarter of the old Constitution has succeeded

W. B. GREGORY J. M. ROBERT
GROUP NO. 6

R. L. DAUGHERTY G. H. RHODES
GROUP NO. 7

in laying bare the fundamental principles, with the result that the interest of many of the members never previously heard from has been awakened.

Advance Discussion

The advance discussion indicates no radical disagreement with the proposals, however. Simply one or two questions have been raised as to how the transition will be made from the old to the new. For example, in the matter of grading the members, which is entirely rearranged to take care of young men from the time they enter an engineering school to the time they

are fully fledged in the profession, the question has arisen as to how to take care of the existing Junior members.

Then again in the proposed new line-up of the Council in which a suggestion is made that the Professional Divisions be represented, the point is raised as to how the organization can be worked out whereby the Professional Divisions, a comparatively new activity, can so quickly take their place in the administration of the Society.

Two other interesting points brought up are the reason for incorporating as an object of the Society the advancement of the economic status of the engineer and also the reason for embodying rules for professional practice. These matters are to come up for discussion at the Annual Meeting.

Committee Hopes for Coöperation

The Committee on Constitution and By-Laws is collecting ammunition so as to be in a position to answer all questions which arise. However, the Committee is holding itself open-minded. It realizes it is not the final authority and it places itself in the hands of the membership assembled at the Annual Meeting. The Committee hopes that all members will take an equal interest, so that nothing goes through by default and therefore there will be no cause whatever for criticism. The Society has apparently a great future ahead, and if all will coöperate in securing a Constitution which will take care of our operation for some time to come, the committee will be encouraged to tackle the tremendous amount of work involved in preparing a set of By-Laws to go with the Constitution when adopted.

14 SECTION OFFICERS REPRESENTING 7 GROUPS

(*Continued from page 133*)

the vice-president of the American Water Works and Electric Co., N. Y. City. He was formerly connected with the Interborough Rapid Transit Corporation, as superintendent of motive power. Mr. G. I. Rhodes, the Secretary, is the manager of the engineering department, of Ford, Bacon & Davis, N. Y. City.

From Group No. 3, which includes the Atlantic Coast States, and some southern ones, namely New Jersey, Eastern Portion of Pennsylvania, Delaware, Maryland, Virginia, North and South Carolinas, Tennessee, Georgia, Florida, Alabama and Mississippi, we have selected the Chairman and Secretary of the Washington D. C. Section. Mr. Ozni P. Hood, the Chairman, is connected with the Bureau of Mines. He is a mining engineer as well as a mechanical engineer, and is the vice-president of the American Association for the Advancement of Science, Philadelphia. Mr. Charles E. Oakes, the Secretary, is with the Federal Power Commission at Washington. He was formerly with the Bureau of Standards, as an associate electrical engineer. He worked with the Safety Code Division in the development of the Safety Code for Elevators.

Group No. 4, which includes northern New York State, Western Portion of Pennsylvania, Ohio, West Virginia and Kentucky, is represented by the Chairman and Secretary of the Cleveland Section. Colonel J. B. Dillard, who is the Chairman, and is on the Executive Staff of the Cleveland Twist Drill Co. During the world war, he was in charge of all new Ordnance designs for the U. S. Army Gun Carriages, at the office of the Chief of Ordnance War Department. He was later Chief of Railway Gun Carriage Section and Chief of Engineering Division, Ordnance Department, Washington, D. C. Mr. Charles H. Day, who is the Secretary, is with the Cleveland Electric Illuminating Co.

Group No. 5, which is that section around the Great Lakes, including Michigan, Minnesota, Wisconsin, Illinois and Indiana, is represented by the Chairman and Secretary of the Chicago Section. David Lofts, the Chairman, is the chief engineer in the Steel Foundries, Chicago. Mr. J. D. Cunningham, the Secretary, is the president of the Republic Flow Meters Co.

Group No. 6, which is the territory throughout the middle west and west to the coast states, including Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, North and South Dakota, Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, and Idaho, is represented by the Chairman and Secretary of the New Orleans Section. Professor W. B. Gregory, Chairman of the Section, is a professor of experimental engineering at Tulane University, as well as being with the United States Department of Agriculture. He was a Manager of the Society from 1916–19, and one of the Vice-Presidents 1921. During the World War, he was a Major with the Engineers, and served in the A. E. F. in France for about two years. Professor James W. Robert, the Secretary, is a professor of machine design at Tulane University.

From Group No. 7, which includes the western coast states, namely Washington, Oregon, California and Nevada, we have chosen the Chairman and Secretary of the Los Angeles Section. The Chairman, Professor Robert L. Daugherty, is a professor of mechanical and hydraulic engineering, in the California Institute of Technology. Mr. G. H. Rhodes, the Secretary, is an industrial engineer with Bishop & Co.

SPECIAL COMMITTEE ON CODE OF ETHICS CONTINUED FOR YEAR

Hopes to Secure Adoption by Four Societies of a Joint Code for Engineering Profession

The Special Committee on Code of Ethics has at its own request been continued for another year. The main reason for this is that the Committee hopes by that time to secure the adoption by the four societies of Civil, Mining, Mechanical and Electrical Engineers of a Joint Code for the engineering profession. This is admittedly a large order, but the Committee is undertaking it with many promises of its going through.

The Chairman of our Committee, Prof. A. G. Christie, in a letter to all the members of the Joint Committee, states: "An earnest desire to make engineering a real profession prevails among leaders in all its branches, and the need of a common Code of Ethics is recognized by these men. Let us therefore come to a definite agreement as early as possible, so that our Joint Committee can present a Code which will place engineering on a truly professional basis."

A progress report of our Committee on Code of Ethics is being included with the Annual Reports of Committees which will be distributed at the Annual Meeting. Later this will be abstracted in MECHANICAL ENGINEERING. A report of the Joint Committee is also in process of preparation and will be similarly noted in our publication.

Professor Christie, besides being chairman of our Committee, is chairman of the Joint Committee, and the personnel of the Joint Committee is:

Prof. J. V. Martenis (A.S.M.E.), Minneapolis Minn.
Robert Sibley (A.S.M.E.), San Francisco, Cal.
H. J. Hinchey (A.S.M.E.), Chicago, Ill.
A. M. Hunt (A.S.C.E.), New York, N. Y.
C. C. Elwell (A.S.C.E.), New Haven, Conn.
Geo. F. Sever (A.I.E.E.), Boston, Mass.
S. S. Wheeler (A.I.E.E.), Ampere, N. J.
Frank T. Chapman (A.S.H.V.E.), New York, N. Y.
S. A. Jellett (A.S.H.V.E.), Philadelphia, Pa.
Perry West (A.S.H.V.E.), New York, N. Y.
Philip W. Henry (A.I.M.E.), New York, N. Y.
J. Parke Channing (A.I.M.E.), New York, N. Y.
Chas. T. Main (A.S.M.E.), Boston, Mass.
L. B. Stillwell (A.I.E.E.), New York, N. Y.
A. G. Christie (A.S.M.E.), *Chairman*, Baltimore, Md.

ORGANIZATION CHART SHOWS PROFESSIONAL DIVISION DEVELOPMENT

Embodies Elements Adapted for Coöperation of Sub-Committees and Liaison with Local Sections

The total registration in the Professional Divisions is now nearly 8,000 members and the chart on page 135 shows how far the organization of the several Divisions into committees and sub-committees has been effected. Of course the organization has been along the simplest possible lines until it could be seen just how this activity would fit in with the other activities of the Society. The report of the Special Committee on Society Activities which has been presented to the Council, and probably to be referred to the membership at the Annual Meeting, makes fundamental recommendations regarding the fitting in of the Professional Divisions with the general meetings, the Local Sections and the various technical activities of the Society. The organization chart of the Divisions may then be modified somewhat, although it will be seen that the organization already embodies elements adapted for coöperation, such as sub-committees of the Divisions on Meetings and Papers, on Membership, on Publicity, and liaison with Local Sections.

It is conceded of course that in work like that which the Society undertakes, the chart of organization is merely a drawing, published primarily for the purpose of focusing more interest upon this particular activity and developing the spirit of desire to coöperate in this work. An organization is a collection of individuals grouped to get results of a certain kind under a given set of conditions. The Professional Divisions are organizations within the main organization of the Society, primarily to promote the technical and engineering activities and to keep the Society well abreast of the latest thought in engineering technology. All members who are interested can find an opportunity to serve in this new activity, which, although only eighteen months old, has already extended to over 50 per cent of the membership.

ALL COMMITTEES WILL REPORT AT ANNUAL BUSINESS MEETING

Following the precedent the Council will present at the Business Meeting of the Annual Meeting the reports of all standing committees for the fiscal year ending September 30, 1921.

The usual reports include those on finances, on the general meetings, on the publications, on the state of the membership, on the local sections work in all its phases, on the professional divisions which have now taken their place among the standing activities, on the constitution and by-laws, noted elsewhere in this issue, on the library, which is part of the joint library of the Engineering Societies, on the research work, on standardization, on the boiler code and interpretations, on the power test codes and on the code of ethics.

These reports occupy 62 pages and will be presented complete in booklet form to each member attending the Business Meeting at the Annual Meeting. Copies of these may be obtained by any one upon application to the Secretary. The report of the Finance Committee is being published in this issue, and the other reports will be published later in abstract form. Further, the fundamentals of the reports will be included in the Council report, which is published each year in Transactions. Through these media, therefore, each member of the Society has an opportunity to familiarize himself with the work of the standing committees of the Council.

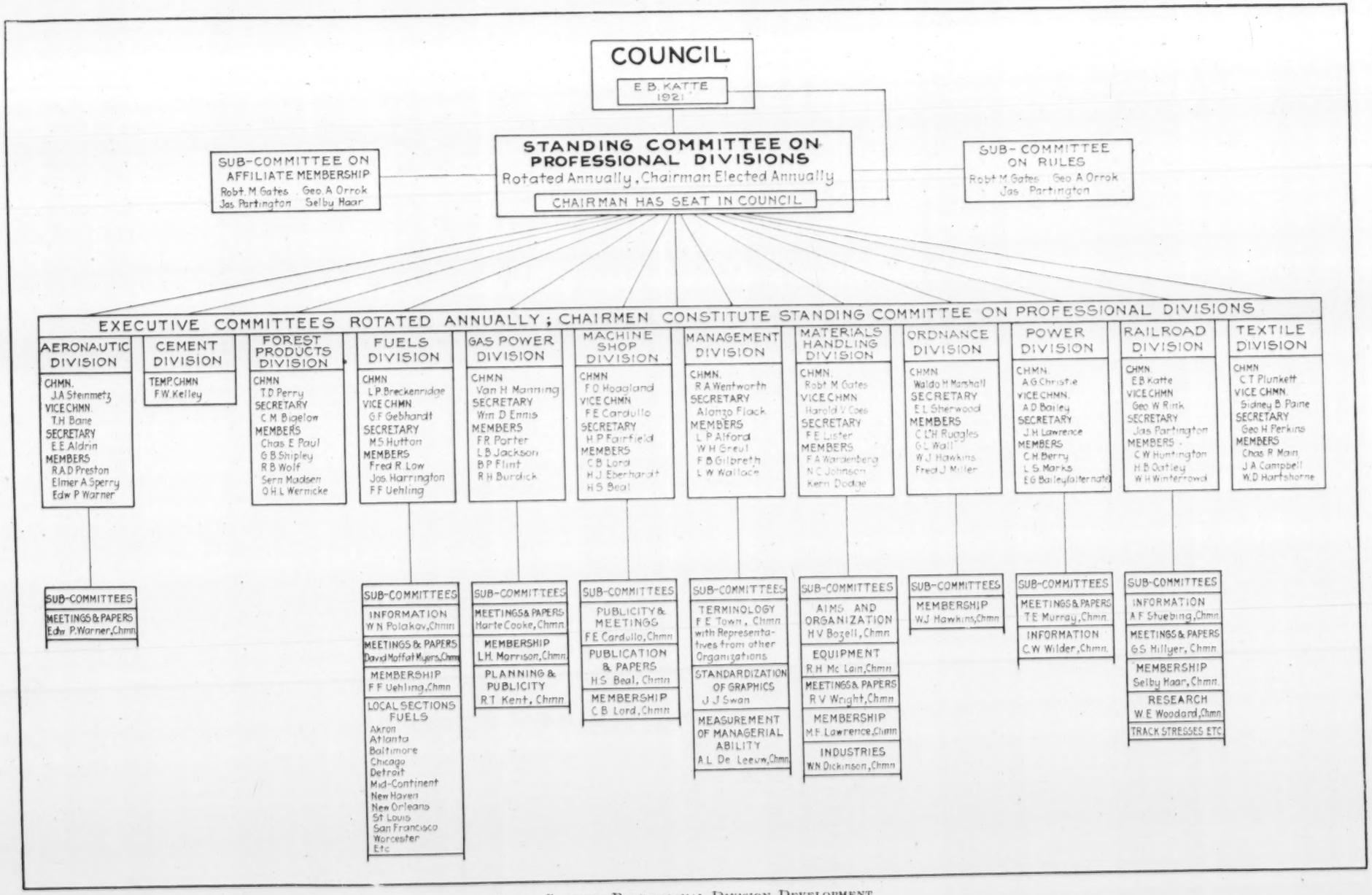

CHART SHOWING PROFESSIONAL DIVISION DEVELOPMENT

PROFESSIONAL DIVISIONS AND REPRESENTATIVES OF LOCAL SECTIONS COMMITTEE MEET

Discuss Society Activities Report and Professional Grouping of Metropolitan Section—Division Notes

The Standing Committee on Professional Divisions held a meeting in New York on November 7. Representatives of the Committee on Local Sections were invited and discussed the phases of the report of the Special Committee on Society Activities having to do with the relations of these two groups. Then representatives of the two committees and of the Meetings and Program and of the Publication and Papers Committees appeared before the Executive committee of the Council on November 15, and spoke on the recommendations of the Society Activities Committee.

On the afternoon of November 7, the members of the Professional Divisions Committee met with the Standing Committee on Meetings and Program of the Society and laid out tentatively the professional program for the Spring Meeting.

Division Cooperation with Metropolitan Section

Another item of business being taken up by the Committee on Professional Divisions is the relations with the Metropolitan Section, which is considering a plan of organizing itself into professional groups corresponding with the national Professional Divisions. This is an interesting possibility as the Metropolitan Section now has over 3,200 members and is therefore much larger than many national societies. It is as large as the Society itself was twelve years ago. This season the Metropolitan Section has actually arranged its program along professional lines, and the Professional Divisions have been coöperating in securing speakers.

Notes from the Divisions

Mr. Joseph A. Steinmetz, Chairman of the Executive Committee of the Aeronautic Division, has returned safely from Europe and will relate his experiences upon opening the Aeronautic Session at the Annual Meeting. Lt. Edwin E. Aldrin Secretary of the Division, is still abroad, but hopes to be back in time for the Aeronautic Session, and he, too, will speak.

The Forest Products Divisions Executive Committee expects to have a meeting after the Forest Products Session at the Annual Meeting.

The Fuels Division is conducting a session at the Annual Meeting and has also arranged excursions as announced in the program.

Motion pictures will be a feature of the Materials Handling Divisions activities at the Annual Meeting. These pictures were planned in lieu of an excursion, with obvious advantages.

The Ordnance, Power, Railroad and Textile Divisions are conducting sessions at the Annual Meeting in addition to those already noted above.

THE SECRETARY'S LETTER

Training and Ideals Peculiarly Fit Engineer to Render Service to the Public

The Secretary in his reading recently has found a definition which might be applied to the Society in its endeavor to serve the public:

> What is the aristocracy of a democratic state? A small body of enlightened people at its head, conscious of its duty to the commonwealth and religiously determined to set the highest possible standard in manners and morals, in order that the state may make a powerful contribution to the higher life of the human race.

The Secretary attended last month the reception tendered by the members of the Engineers Club of New York to Secretary of Commerce, Herbert Hoover. In the course of Mr. Hoover's informal remarks, he stated that he was the second engineer, in the one hundred and fifty-five years of the history of the United States, to hold high office under the Government, George Washington having been the first.

Mr. Hoover stated that the engineer was peculiarly fitted to render service to the public by virtue of his training and his ideals. We are accustomed to dealing with facts, and he stated that it was his ambition to have the Department of Commerce known, and that it would be a "fact-procuring department," but that it would have no controlling functions whatsoever.

I believe we have one member of Congress who is an engineer and the head of a big manufacturing organization, and he is a member of The American Society of Mechanical Engineers.

Early last month the Connecticut Section held a meeting in Hartford with two engineer governors as speakers, Governor Everett J. Lake, and Governor James H. Hartness, former member of the Council.

Referring to the quotation at the head of this article, can we not make the Society live up to the ideal set by Secretary Hoover, and in the various engineering undertakings of the United States, whether they be the development of its Alaskan railroads, the reclamation of arid lands in the West or swamps in the South, or the St. Lawrence Power project, be the "fact-procuring" group whose function and service are of the highest importance and also pertinent to our profession?

It is Mr. Hoover's opinion that fifty per cent of all the difficulties in the world are due to the failure to have all the facts.

Think what a contribution, therefore, the engineer can give to society by bringing to the solution of problems the engineers' method of attack, namely, the securing of the facts.

As is well known, the Secretary is urging all Local Sections to take hold of local engineering projects, under the wing of the civic body which would ordinarily handle it, namely the Chamber of Commerce, the Rotary Club, or other body, thus combining the special type of service which the engineer may render with that of the business men and merchants accustomed to dealing with large affairs.

CALVIN W. RICE, *Secretary*

COLLEGE REUNIONS PLANNED FOR THE ANNUAL MEETING

In accordance with the practice which has been maintained for several years past, the engineering Alumni of various colleges will hold Reunions on Friday Evening, December 9. These Reunions give the out-of-town Alumnus a chance to meet with others of his Alma Mater residing in New York and other cities. Opportunity will be provided at registration headquarters for any interested in these various Reunions to register and get full information.

STANDING COMMITTEE ON FINANCE PRESENTS FISCAL YEAR REPORT

Despite Increased Costs Expenditures Come Within Income; Outlook for New Year Brighter

The Standing Committee on Finance has just made to the Council its annual report for the fiscal year ended September 30, 1921.

Despite a year of continued increased costs, the expenditures have been kept within the income. However, this has not been done without some sacrifices, notably the completion during the fiscal year of only half the work on the 1920

Coming Section Meetings

Atlanta. December 13. Meeting to enable the Delegates to report on the Annual Meeting.

Baltimore. December 14. At Engineers' Club. Meeting to be in charge of Committee on Gas Power.

Buffalo. December 7. Subject: Researches into Foundry Practices, by Enrique Touceda, Consulting Engineer to the American Malleable Casting Association, Albany, N. Y.

Cleveland. December 6. At Hotel Winton, Cleveland, Ohio.

Connecticut State.

Hartford Branch. December 19. Subject: Refrigeration and Air Conditioning.

Metropolitan. (N. Y. C.) December 5–9. Annual Meeting of A.S.M.E. in Engineering Societies Building.

December 16. Visit to Babcock & Wilcox Boiler Works, in Bayonne, N. J., followed by a supper and an evening meeting, at which several speakers will present talks on Pulverized Fuel from the Operating Standpoint.

Philadelphia. December 20. Symposium on Materials Handling, under the auspices of the Professional Division on Material Handling and possibly with the coöperation of the Philadelphia Chamber of Commerce.

Toledo. December 15. At Toledo Edison Co. Auditorium. Gas Manufacture, Distribution, etc., by A. Johnson of the Atlas Chemical Co., Toledo, O.; Industrial Fuel, by Henry O. Loebell, of Henry L. Doherty Co., N. Y. C. Mr. Johnson's lecture will be illustrated by 72 lantern slides, and there will be a motion picture film shown, both loaned by the American Gas Association.

Virginia. December 9. At Murphy's Hotel, Richmond, Va. Subject: The Engineer in Foreign Trade.

Washington D. C. December 9. Auditorium, Interior Department. Subject: Engineering Standardization, by A. A. Stevenson, Chairman American Engineering Standards Committee.

Western Washington. December. At Faculty Men's Club, Seattle, Wash. Joint meeting with Student Branch, University of Washington.

volume of Transactions, and the postponement of the publication of the Year Book from January, 1921 to December, 1921. If both of these publications had been completed during the fiscal year our surplus would have become a deficit. This shows how closely expenditures have to be watched, especially as the activities of the Society are so numerous and the costs of all work done are still so high. The position for the new fiscal year, however, promises to be a slightly better one.

Below is published a report of the committee which gives interesting comparisons of unit costs as compared with last year, a statement of the Reserve Account, and the proposed budget for the new fiscal year.

Report of the Finance Committee

The total gross receipts of the Society from all sources for the fiscal year, October 1, 1920 to September 30, 1921, were $497,401.18, and the gross expenditures chargeable to current receipts were $479,419.10, leaving an excess of receipts over expenditures of $17,982.08.

Deducting from the gross receipts the amounts spent (a) to handle new membership applications, (b) to secure and produce the advertising in the publications, (c) to handle sales of publications, and reserving $16,700.00 for obligations undertaken but not completed at the end of the fiscal year, the net current income was $310,120.04, and the expenditures chargeable against this income $292,137.96, leaving an excess of $17,962.08 as above. The net figures indicate the amounts received and spent for committee activities.

Based on a membership of 12,860 (the average of the total membership for the year, October 1, 1920, to October 1, 1921), the average gross current receipts of the Society per member for the fiscal year just closed are tabulated below. The corresponding receipts for the preceding year are included for comparison.

AVERAGE GROSS RECEIPTS PER MEMBER

	1919–20	1920–21
Membership Dues	$14.40	$15.07
Initiation Fees	3.47	4.72
Sales-Gross Receipts	4.30	4.35
Advertising	14.00	14.15
Interest & Discount	.69	.38
Total	$36.86	$38.67

Based on the same average membership, the expenditures per member for the fiscal year just closed are also given below, together with the corresponding expenditures per member for the previous year for comparison.

AVERAGE GROSS EXPENDITURES PER MEMBER

		1919–20		1920–21
Meetings, Annual and Spring		$ 1.32		$ 1.49
Publications:				
MECHANICAL ENGINEERING	11.40		11.34	
Condensed Catalogues	3.65		3.03	
Transactions (Part Volume only 1920–21)	2.81		.95	
Year Book (not printed this year)	1.32		...	
		19.18		15.32
Membership and Increase of Membership*		.47		1.91
Secretary's Department		1.33		1.53
Accounting Department		.75		.86
General Office Administration		2.25		2.30
Joint Conference Committee**		.25		.10
Joint Activities:				
Assessment to U. S.	.58		.72	
Library	.55		.60	
Engineering Council**	.42		.09	
Employment Bulletin**	.24		.06	
American Engineering Standards Committee	.13		.12	
Federated American Engineering Societies	....		1.15	
		1.92		2.74
Local Sections		2.76		3.35
Council, Contingencies, Milage		1.22		1.16
Student Branches		.08		.10
Cost of Sales (Publications, Pamphlets, etc.)		3.43		3.63
Engineering Committees (Standardization, Research, Boiler Code, Power Test Codes, etc.)		1.29		1.68
Professional Divisions		.11		.30
Other Activities		.14		.94
		$36.50		$37.41

* This includes rebate of 25% of initiation fees of new members through Local Sections.

** Now included in the Federated American Engineering Societies.

STATEMENT OF RESERVE ACCOUNT AS OF OCTOBER 1, 1921

During the year $4,488.24 was expended against the amount advanced, $19,000.00, for the development of Mechanical Engineering making the total expended against this advance to date $13,649.57. This amount is to be repaid later.

Reserve, October 1, 1920	$128,664.02
Obligations for Work not yet completed	16,700.00
Excess of current income over expenditures 1920–21	17,982.08
	163,346.10

Less expenditures from Reserve as follows:		
Excess expenditures over anticipated for unfilled obligation 1919–20	$2,113.21	
Expenditures for Journal Development ($19,000.00 advance for 3 years authorized by Council)	4,488.24	
Cancelled arrears	1,110.63	7,712.08
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Reserve October 1, 1921		$138,934.02

ANALYSIS OF RESERVE ACCOUNT AS OF OCTOBER 1, 1921

Working Cash in Banks	$ 1,278.39	
Bonds EXCLUSIVE of Trust Funds	46,525.84	
Stores and Work in Progress	80,329.79	
		$138,934.20

NEW FISCAL YEAR

For 1921–22, the Finance Committee estimates the total current income available from the several sources as follows:

Membership dues		$217,000.00
Initiation fees		48,000.00
Interest		7,000.00
Advertising:		
MECHANICAL ENGINEERING	$143,000.00	
Condensed Catalogues	65,000.00	
		208,000.00
Sales		70,000.00
		$550,000.00

THE FINANCE COMMITTEE HAS RECOMMENDED THE FOLLOWING BUDGET TO THE COUNCIL

		Recommended Appropriations
Membership and New Members		$ 8,500.00
General Meetings		15,750.00
Publications:		
MECHANICAL ENGINEERING Advertising	$ 90,000.00	
Condensed Catalogues	46,600.00	
Sales	57,400.00	
MECHANICAL ENGINEERING Text	70,600.00	
Transactions	27,000.00	
Year Book	15,000.00	
		396,600.00
Council and Mileage		10,500.00
Local Sections		50,800.00
Professional Divisions		5,000.00
Standardization, Research, Power Test Codes		13,050.00
Boiler Code		5,200.00
Library		8,000.00
House		500.00
Student Branches		2,800.00
Federated American Engineering Societies		22,500.00
American Engineering Standards Committee		1,500.00
Secretary's Department		16,000.00
Accounting Department		10,000.00
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Respectfully submitted,

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THE FINANCE COMMITTEE HAS RECOMMENDED THE FOLLOWING BUDGET TO THE COUNCIL

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General Meetings		15,750.00
Publications:		
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Condensed Catalogues	46,600.00	
Sales	57,400.00	
MECHANICAL ENGINEERING Text	70,600.00	
Transactions	27,000.00	
Year Book	15,000.00	
		306,600.00
Council and Mileage		10,500.00
Local Sections		50,800.00
Professional Divisions		5,000.00
Standardization, Research, Power Test Codes		13,050.00
Boiler Code		5,200.00
Library		8,000.00
House		500.00
Student Branches		2,800.00
Federated American Engineering Societies		22,500.00
American Engineering Standards Committee		1,500.00
Secretary's Department		16,000.00
Accounting Department		10,000.00
United Engineering Society (rent)		9,200.00
Reserve		27,500.00
Unexpected Activities		36,600.00
		$550,000.00

Respectfully submitted,

ERIK OBERG, *Chairman*
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S. D. COLLETT, *Vice-Chairman*
THEO. H. HINCHMAN
H. M. LUCAS
Standing Committee on Finance

Recent Section Meetings

Atlanta. November 22. Subject: Water Power Developments of the Southeast, by C. G. Adsit, Consulting Engineer, Ga. Ry. & Power Co.

Baltimore. October 7. Joint meeting with A.I.E.E. at Engineers' Club. Discussion of The Electric Drive.

October 8. Inspection of the *U. S. S. Maryland*, at Annapolis, Md.

November 9. At Engineers' Club. Meeting to discuss railroads.

Birmingham. October. Subject: Electrical Cleaning of Blast-Furnace Gas, by N. H. Gellert, President of Gellert Engineering Co.

Boston. October 10. Subject: Records of continuous Operation of Power Plants, by F. M. Gibson, Plant Engineer, American Sugar Refinery.

Buffalo. November 2. At Lafayette Hotel. Subject: Progress in Mechanical Engineering Research, by Prof. Arthur M. Greene, Jr., Chairman in A.S.M.E. Research Committee, Rensselaer Poly. Inst., Troy, N. Y.

Central Pennsylvania. November 7. At Williamsport, Pa. Inspection trips were made to the following plants: Lycoming Rubber Co.; Lycoming Motors Corp.; Williamsport Wire Rope Co.; Valley Iron Works; E. Keeler Co.; Lycoming Edison Co.; J. K. Rishel Furniture Co. The following papers were presented: Waste in Industry, by L. W. Wallace, Secy. F.A.E.S.; Fundamentals of Cost Control, by P. P. Henshall; Manufacturing Costs, by J. P. Jordan, industrial engineer, N. Y. C.

Chicago. November 21. Joint meeting with Western Engineering Society in their rooms. Symposium of Engineers.

Cincinnati. November 5. Inspection trip to the Cincinnati Water Works.

Cleveland. October 4. Subject: Molybdenum Steel, by W. C. Peterson, metallurgical engineer, Atlas Crucible Steel Co.

November 1. At Hotel Winton. Subject: Die and Mold Making by Machine, by Jas. F. Keller, of the Keller Mechanical Engraving Co., Brooklyn, N. Y.

Colorado. October 28. Subject: Properties of Cast Iron and Gray-Iron Foundry Methods, by Wm. Lester, Vulcan Iron Works, Denver, Colo.

Connecticut State

Bridgeport Branch. November 17. Subject: Silencing Noises, by H. P. Maxim, of the Maxim Co., Hartford, Conn.

Hartford Branch. November 3. At Bond Hotel. A dinner preceded the meeting. Subject: Relations of the A.S.M.E. to the Community. Speakers: Governor Everett J. Lake, of Connecticut, and Roscoe N. Clark, City Engineer, Hartford, Conn.

November 28. Subject: Belting, with an inspection trip in the afternoon to the plant of the Jewell Belting Co., Hartford, Conn.

Meriden Branch. October 20. At Home Club. Subject: Ball Bearings, by R. W. Sellew, Research Engineer, of Fafnir Bearing Co., New Britain, Conn.

New Britain Branch. October 25. At New Britain Club. Engineering Societies, National and International and Their Relations to Industry and Government, by Calvin W. Rice, Secretary, A.S.M.E. What Stops a Moving Train, by Prof. S. W. Dudley of Sheffield Scientific School, of Yale University, and formerly chief engineer with Westinghouse Air Brake Co.

November 22. Subject: Industrial Management, by L. P. Alford, Vice-President A.S.M.E., Ronald Press Co., N. Y. C.

New Haven Branch. October 17. At Mason Laboratory, Yale University. Subject: Problems in Local Transportation, by Pres. L. S. Storrs, of the Connecticut Co.

November 14. At Mason Laboratory. Joint Fuel Conference with New Haven Chamber of Commerce and Local Engineering Society Sections. Symposium on the Economics of the Coal Problem in Connecticut. Quality and Cost Factors in the Mining of Coal, by J. W. Paul, U. S. Bureau of Mines, Pittsburgh, Pa.; Transportation of Coal, by H. W. Payne, Cons. Engr., Andrade Eyre Inc., N. Y. C.

Waterbury Branch. November 8. At Chamber of Commerce Hall. Subject: The Engineer's Relation to the Manufacture of Cotton Cloth, by James W. Cox, N. Y. C.

Detroit. October 14. At Board of Commerce. Subject: Committee's Reasons for Recommending the Proposed Changes in Constitution and By-Laws, by Arthur L. Rice, Chicago, Ill.

October 21. At Detroit Institute of Arts. Second meeting of affiliated technical societies of Detroit. Subject: Engineering and Architecture, by R. Clipson Sturgis, Past-president of the American Institute of Architects.

Kansas City. October 27. At University Club. Get-together meeting.

November 28. Regional Meeting. Geology of the Oil and Gas Industry, by Dr. L. G. Snider, Evertt Carpenter, and M. M. Valerius; Machinery Methods and Difficulties of Drilling, by R. D. Bush, Ross M. Stuntz, C. P. Demit and A. L. Bramer; Transportation of Oil by Pipe Lines, by S. B. Severson; Mechanical Methods of Refining, by Floyd Brown and Clay Briggs; Chemical Processes, by Dr. Francis of Cosden Co., Tulsa, and Dr. Burton of Standard Oil Co.; Products of the Oil Industry and their Uses; Discussion of the Oil Supply of the World, by Mr. Ambrose of the Bureau of Mines, Washington, D. C.; Financial Side of the Oil Business.

Lehigh Valley. October 11. At Lehigh University. Waste Heat Boilers, by H. R. Smith, of Babcock & Wilcox Co.; Utilization of Waste Heat in the Steel Industry, by A. T. Lewis of the Bethlehem Steel Co.; Utilization of the Waste Heat of Rotary Cement Kilns, by Joseph Brockton, of Dexter Portland Cement Co.

Metropolitan. October 28. Inspection of Harrison Works of the Crucible Steel Co.; dinner at the Downtown Club and meeting in evening. Subject: Clean Cold-Producer Gas from Bituminous Coal, by C. F. Kaufman, of the Atha Works of the Crucible Steel Co.

November 14. Joint meeting with A.I.E.E., A.I.M.E. and A.S.C.E. Subject: St. Lawrence Canal. Governor Henry J. Allen, of Kansas addressed this meeting.

Ontario. October 25. At University Club. Subject: Present-Day Practices in Hydraulic-Turbine Design, by M. V. Sauer, hydraulic engineer of design, Hydro Electric Power Commission, of Ontario.

November 9. At Engineers' Club, Toronto, Canada. Subject: The Present Status of Standardization in Europe, by Prof. R. J. Durley, Secretary of the Canadian Engineering Standards Association, who recently returned from the International Conference on Standardization.

Philadelphia. November 22. At Roof Garden, Adelphia Hotel. Annual Smoker and Get-together of Section. Commander H. C. Richardson of the U.S.N. spoke on Experiences on the NC-3 During the Transatlantic Flight. Moving pictures taken during the flight were shown.

Plainfield. October 24. Held in the gymnasium of Plainfield High School. Subject: Some Problems Encountered in Design and Construction of New Tube Under the Hudson River, by Clifford M. Holland, chief engineer, New York-New Jersey Vehicular Tunnel.

Providence. November 11. Subject: The Manufacture of High-Grade Paper, by R. E. Rindfusz, secretary of the American Writing Paper Co. of Holyoke, Mass.

Rochester. November 14. In rooms of Rochester Engineering Society. Joint meeting with the Industrial Management Council, Superintendent's Division, of the Chamber of Commerce. Subject: Tool Design and Maintenance for Quantity Production.

St. Louis. October 28. At Hotel Claridge. Subject: Combustion and Smoke Prevention, by William H. Pittsford, Kewanee Boiler Co., Kewanee, Ill.

November 16. At Engineers' Club. Subject: Construction of a Six-Million Barrel Oil Refinery at Fall River, Mass. for the New England Oil Corp., by C. C. Smith, chief engineer, Unit Construction Co. Lecture was well illustrated with motion pictures.

November 25. At Washington University. Subject: Patents and Engineering, by F. Du Pont Ammen, of Elliot & Ammen, Attys. at law. Joint meeting with the Student Branch of Washington University.

Toledo. November 17. At Toledo Commerce Club. Subject: The Industrial Engineer in Business, by Clifton B. Reeves, of Willys Overland Co.

Virginia. November 11. At the Richmond Hotel. Fall Rally meeting, afternoon and evening. Subject; The Engineer's Place in Industry.

Worcester. November 17. Joint meeting with the Worcester Section A.I.E.E. This meeting included an afternoon inspection trip, buffet lunch and an evening session.

Student Branch Meetings

Alabama Polytechnic Institute. September 28, 1921. Business Meeting. The object was to get the members together and discuss plans for the coming year.

Bucknell University. October 3, 1921. Campaign for new members. Professor Woods of State College gave a talk concerning the activities and large field for engineers in the vicinity of the College, while Professor F. E. Burpee told briefly of the advantages, activities, etc., of the local chapter. Refreshments were served.

University of California. October 19, 1921. L. A. Ashley, B. S., Graduate student in mechanical engineering gave a talk on Human Engineering. He brought out the fact that there has arisen recently a tendency in industry looking toward the better handling of men through the betterment of their working conditions and through better treatment and more consideration for the worker on the part of the employer, in contrast to the older policies of machine-before-man. He emphasized the necessity of being a "human engineer" as well as a technical engineer in order to make a success in business.

B. R. Vanleer, assistant professor of mechanical engineering spoke on his experiences in conducting tests for the Southern Pacific Company during the summer vacations, pointing out those things of which to be especially careful in conducting tests.

Case School of Applied Science. October 18, 1921. Col. J. B. Dillard gave a talk on the training of a civil engineer at West Point, refering to the methods of study, recitation, conduct, and military training. The difference between the older and newer methods of training at West Point was very well defined. Colonel Dillard also enlightened the students and the faculty members as to the relation between the student section, the Cleveland Section, and, the National Association.

(Colorado) The State Agricultural College. October 10, 1921. The following officers were elected for the year: L. G. Hemphill, chairman; Arthur Wallace, vice-chairman; John Moffett, secretary; J. L. Richerson, treasurer.

Drexel Institute. October 14, 1921. Professor J. H. Billings spoke on the relation of the A.S.M.E. to students and to practicing engineers. Professor Disque urged the engineer to specialize in one system of work and

to become an authority on it. Professor McDonald showed the necessity of engineers paying more attention to their social activities, and of well advertising any good work they have done. Professor Knoerr told of the great need of practical shop experience by modern engineers. Professor Kolyn, an army engineer, described the most modern methods of mining coal. Dean Linthicum urged the graduate engineer to seek for a work that will give him experience in his line instead of first trying for higher positions.

University of Illinois. September 24, 1921. Annual Smoker.

University of Kansas. October 13, 1921. Mr. W. R. Kell gave a report of the general plans laid out at the Conference held in Chicago.

Lafayette College. October 1, 1921. The following officers were elected for the ensuing year: J. B. Fogg, chairman; Morris R. Williams, vice-chairman; C. C. Shirer, secretary; John H. Cameron, Jr., treasurer and I. C. Brotzman, publicity secretary.

October 18, 1921. Illustrated lecture on Combustion.

Louisiana State University. October 12, 1921. Mr. C. C. Lynd of the Armco Iron Co. presented a lecture on the Processes of Manufacture of Armco Iron, which was accompanied with slides.

October 18, 1921. Business meeting.

Massachusetts Institute of Technology. On October 10th, several of the Branch members went on a trip, managed by the Boston Section, through the American Sugar Refinery. Afterward they attended the buffet supper held at the Engineers' Club and enjoyed a paper on the operating code for power plants which was read by Mr. Gibson of the American Sugar Refinery.

October 19, 1921. A moving picture was shown of the making of lamp cord from thin wire strand up to the finished product. Professor E. F. Miller spoke on the benefits derived from membership. Major Maish told of the work of the mechanical engineer during the war in regard to design of armament and the elimination of the difficulties of manufacture. He urged the members to join the ordnance unit which was maintained for students taking the mechanical engineering course. Professor H. W. Hayward spoke of the value of acquaintanceship formed through the medium of the society. The prime object of the meeting was to obtain new members for the coming year and to introduce the newly elected officers to the members. The meeting closed with the serving of refreshments.

University of Montana. October 4, 1921. Business meeting. The following officers were elected: M. Bentall, chairman, W. C. Hardy, vice-chairman; H. L. Tenney, secretary and E. S. Wilson, treasurer.

October 11, 1921. After the business of the society was completed and committee reports were read and approved, the meeting was turned over to Professor Therkelsen of the mechanical engineering faculty of the college, who gave an interesting and instructive lecture and demonstration on The Slide Rule.

October 25, 1921. The following papers were presented, The Practical Application of Mathematics by Morris Bentall, The Life of Rudolph Diesel by Leslie Gilbert, and The Life of Dugald Clerk by Adam Fiscus.

University of Nebraska. October 19, 1921. Obligations of the Engineer by Harold Holtz and The Manufacture of Water Gas by P. C. Krutz.

Rensselaer Polytechnic Institute. October 4, 1921. The following officers were elected for the college year: Chairman, Terkoski; vice-chairman, Goetzman; secretary, Bueb and treasurer, Bull. The class of '23 brought thirty-one new members in, and plans for a very successful season are being made.

Washington University. October 16, 1921. Business Meeting. Remarks by Chairman on Engineers' Day at Washington University.

October 20, 1921. Mr. C. K. Traber, chief engineer of A. Leschen & Sons Wire Rope Co., gave an address to the students on the Manufacture and Use of Wire Rope, which was illustrated with motion pictures.

University of Wisconsin. October 6, 1921. Professor G. L. Larson made some suggestions for creating interest in the Student A.S.M.E., while Professor Corp talked on the sanitary conditions of Camp Kearney during the war.

Yale University. October 18, 1921. Chairman J. W. Clise announced committees and made a speech of welcome and introduction to the speaker of the evening, Calvin W. Rice, Secretary of The American Society of Mechanical Engineers. Mr. Rice gave a very interesting and instructive talk on The Relation of the A.S.M.E. to the Student Branches. Following his talk a moving picture was shown—projected from the mechanical engineering department's new moving-picture machine. Twenty new members were enrolled after the entertainment was over.

Committee Meetings

Materials Handling Division, executive committee, on October 13.

Standardization of Shafting, sectional committee under the A.E.S.C. on October 21.

Power Division, executive committee, on October 21.

Textile Committee of Metropolitan Section, on October 24.

Standardization of Gears, sectional committee under the A.E.S.C., on October 27.

Fuels Division, membership committee, on October 27.

Refrigerating Machines and Plants, Individual Power Test Code Committee, on November 7.

Professional Divisions, standing committee, on November 7.

Management Division, executive committee, on November 7.

Mechanical Transmission of Power, sectional committee under the A.E.S.C., on November 9 and 10.

Standardization of Pipe Flanges and Fittings, organization meeting of new sectional committee under the A.E.S.C., on November 18.

Personals

DEAN J. DEBUTTS has resigned as manager of the Dallas, Tex., office of F. W. Freeborn Engineering Corporation to accept an interest in the Knapp-Ritzmer Co., Inc., construction engineers with headquarters in New York.

PRESTON M. SMITH has recently been appointed general sales manager of The Manthey-Zorn Laboratories Co., Cleveland, Ohio.

G. EDW. BARNHART is now vice-president and consulting engineer of Barnhart Aircraft Inc., Pasadena, Cal.

CHARLES F. LEONARD has become vice-president of Walter N. Polakov & Co., Inc., New York City, and will have charge of business promotion for that firm. He has severed his connection with the American Institute of Weights and Measures, for which he has been acting as technical advisor.

ALAN A. WOOD, for a number of years connected in an engineering and sales capacity with the Providence plant of Builders Iron Foundry and Diamond Machine Company, associated companies, is now sales manager of the Philadelphia district, with office in Philadelphia.

M. H. ROBERTS, chief engineer of the Franklin Railway Supply Company, Inc., New York, is chairman of a board of engineers recently appointed by Director H. Foster Bain of the Bureau of Mines to study the production of helium in Texas. PROF. W. L. DEBAUFRE of the University of Nebraska, is also serving on this board.

Necrology[1]

DAVID HERBERT ANDREWS, president of The Boston Bridge Works, died on February 24, 1921. Mr. Andrews was born on September 17, 1844, in Pepperell, Mass. He was graduated in 1860 from the Chandler School of Science connected with Dartmouth College, receiving the degree of B.S. After two years' teaching experience, he entered the service of the National Bridge and Iron Works, East Boston, Mass. In 1876 the company met with financial difficulties and Mr. Andrews left to establish his own business under the name of the Boston Bridge Works. In 1901 this company was incorporated with Mr. Andrews as president. Mr. Andrews was a member of the American Society of Civil Engineers, the Boston Society of Civil Engineers, the Engineers' Club of Boston and the Boston City Club. He became a member of our Society in 1913.

RAYMOND S. BALDWIN, director of the Carbon Steel Co., Pittsburgh, Pa. died on September 3, 1921. Mr. Baldwin was born on June 22, 1881, in Newark, N. J. He was educated in St. Paul's School, Concord, N. H. and Stevens Institute of Technology from which he was graduated in 1903. In 1906 he was appointed secretary of the Carbon Steel Co. and in 1916 director. Shortly before his death he resigned from the position of vice-president and comptroller of J. H. Williams & Co., Buffalo, N. Y. He became a member of our Society in 1918.

ARTHUR N. FOWLER, supervisor of the tool and manufacturing department of the Stanley Rule & Level Co., New Britain, Conn., died on August 24, 1921. Mr. Fowler was born on June 27, 1867, in Milford, Conn. and was educated in the Milford grade and high schools. He was formerly associated with the Hartford Machine Screw Co. and for seven years was foreman of the tool department of the Underwood Typewriter Co., Hartford. In 1914 he became connected with the Stanley Rule & Level Co. where he was located at the time of his death. Mr. Fowler became an associate member of the Society in 1920.

FREDERICK F. GAINES, a member of the Railroad Administration Board until its disbandment in 1920, died at his home in Washington, D. C. on August 26, 1921. Mr. Gaines was born at Hawley, Pa. on March 28, 1871. He was graduated from Cornell University in 1895 with the degree of M.E. He was connected for varying periods during his career with the Lehigh Valley Railroad, the Philadelphia & Reading and the Central of Georgia, with the latter of which he was superintendent of motive power. He was appointed mechanical superintendent of the Southern Region upon the formation of the U. S. Railroad Administration and later when the Railroad Administration Labor Board was created he became one of its members and served until its disbandment. Mr. Gaines was a member of the Railway Master Mechanics Association, the Master Car Builders' Association, the Society of Colonial Wars and the Sons of the Revolution. He was also a Shriner and a Knight Templar. He became a member of our Society in 1901.

RUSSELL W. EATON, for 30 years agent of the Cabot Manufacturing Co., Brunswick, Me., died on March 5, 1921. Mr. Eaton was born in Readfield, Me., on November 24, 1855. He was graduated from Maine State College (now the University of Maine) with the degree of C.E. His manufacturing work was started as assistant agent in the Ponema Mills, Taftville, Conn. He was then connected with the Merchants' Manufacturing Co., Montreal, Canada, as manager, where he was located for five years when he became associated with the Cabot Manufacturing Co., from which he retired as agent and director in 1920. Mr. Eaton was a member and past-president of the New England Cotton Manufacturers' Association. He became a member of our Society in 1894.

HARRY P. MACDONALD, vice-president and chief engineer of Snead & Co., Jersey City, N. J., died on August 25, 1921. Mr. Macdonald was born on May 19, 1880, in Louisville, Ky. He was graduated from Massachusetts Institute of Technology in 1901 with the degree of B.S. in C.E. He entered the employ of the Snead & Co. Iron Works in 1901 and served consecutively as draftsman, assistant superintendent and superintendent, becoming chief engineer and vice-president in 1915. Mr. Macdonald was a member of the Society of Automotive Engineers, the American Society for Steel Treating, the National Foundries Association, the Jersey City Chamber of Commerce, Sons of the Colonial Wars, Sons of the Revolution and the Technology Club of New York. During the War he served on committee work under the Council of National Defense and as adviser to the Metal Trades Board on War Labor Policies. He became a member of our Society in 1914.

JOSEPH H. ROACH, president of Joseph H. Roach & Co., now the Roach Stoker Co., Philadelphia, Pa., died on January 11, 1921. Mr. Roach was born on January 18, 1873, in Philadelphia and was educated in the schools of that city. He was formerly associated with the Philadelphia Carey Manufacturing Co., W. K. Mitchell & Co. and for six years as branch manager of the Hooven, Owens, Rentschler Co. He organized the Roach Stoker Co. in 1916 to manufacture and sell underfeed standard and simplex stokers which he had designed and invented. He was a member of the Union League, Manufacturers' and Engineers' Clubs, all of Philadelphia. Mr. Roach became an associate of the Society in 1919.

RICHARD HUTCHISON, district sales manager of the Boston office of the Babcock & Wilcox Co., died on June 15, 1921. Mr. Hutchison was born on May 25, 1872, in Newcastle, N. B., Canada. He was educated in Annapolis Valley schools, Acadia College and the R. I. Technical Drawing School. He first became associated with the Babcock & Wilcox Co. in 1894 as a draftsman in their New York office and was later made chief draftsman. In 1898 he was appointed district sales manager of the Boston office where he was located at the time of his death. Mr. Hutchison was a member of the Boston Society of Civil Engineers, and the Engineers' Club of Boston. He belonged to the Masonic fraternity. He became an associate member of the Society in 1900 and a member in 1904.

EDWARD F. SCHNUCK, until his retirement in 1919, production engineer and treasurer of Jabez Burns & Sons, New York, died on October 2, 1921. Mr. Schnuck was born in St. Louis, Mo., on September 7, 1870. He was first employed by Burns & Sons in 1888 on the erection of a coffee-roasting plant in St. Louis. Upon the completion of that work, he came east on general millwright work for the same firm. Through study he acquired the necessary engineering knowledge for his work, even to the laying out of complete plants. For ten years he was connected with Arbuckle Brothers as general superintendent of their large coffee plant in Brooklyn, N. Y., resuming his relations with Burns and Sons in 1907 when they were incorporated. He was a director in that concern until his retirement, because of ill health, in 1919. Mr. Schnuck was a member of the American Institute of Electrical Engineers. He became a junior member of our Society in 1897 and a member in 1901.

MATTHEW M. SWEENEY, secretary and general manager of the Fairmount Engineering & Foundry Co., Woonsocket, R. I., died on September 8, 1921. Mr. Sweeney was born in Woonsocket in January, 1879. He was graduated from Brown University in 1906 with the degree of B.S. in M.E. After several years' experience gained with the Taft-Pierce Manufacturing Co., the Bresnahan Show Machinery Co. and the General Electric Co., he became production engineer for the General Fire Extinguisher Co., Providence, R. I. where he was located until 1914 when he became associated with the Woonsocket Machine & Press Co., resigning to establish the Fairmount Company in Woonsocket. Mr. Sweeney became a member of the Society in 1914.

[1] For details of the professional careers of deceased members, see necrology section of the forthcoming issue of the Transactions of the Society.

EMPLOYMENT SERVICE BULLETIN

Conducted by the Employment Service of The Federated American Engineering Societies, 29 West 39th St., New York

POSITIONS AVAILABLE

Stamps should be enclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

ENGINEER conversant with collapsible-tube manufacture from bottom up, and with executive ability for management and control. Requirements would be thorough knowledge of soft-metal casting, blanks from pig lead and pig tin, extrusion process of extruding soft metals, on extrusion presses, including cap presses, and trimming and threading. Metal decorating, includes base coating of inks on offset presses and decoration of coated tubes when dry, with one, two or three colors on offset printing presses; elementary mechanical engineering, factory management, or supervisory capacity. Knowledge of domestic and foreign practices in manufacture of metallic collapsible tubes an asset. No vacancy at present time; but increased business will demand a man of type outlined. Location Del. X-1149.

MECHANICAL ENGINEER. Manufacturer of metal devices will consider engaging mechanical engineer of inventive ability and capable of determining mechanical value of inventions. Location Middle West. Applicants must state age and qualifications; also salary expected. X-1179.

SALES MANAGER for steamfitters supply jobbing house. Must have had experience in pipe-fabricating shop including Van Stoning and bending. Give qualifications, references, and salary desired. Location, New York City. X-1195.

SALES ENGINEERS operating in following and nearby places can add electric pump line and heating specialties for vapor and vacuum. N. J.—Newark, Jersey City, Paterson, New Brunswick, Trenton, etc. N. Y.—Brooklyn, Bronx, Queens, Staten Island. Westchester, Newburgh, etc. Experienced men calling on plumbing and heating contractors, also allied interests will find it a worth while commission connection. In writing mention your territory and present lines. X-1196.

SALES ENGINEER having ability to take charge of sales engineering work, and at same time technical experience in iron and steel foundries, plate fabrication and along structural lines. Location Ga. X-1201.

DESIGNER for dredges, cranes, etc. Steam engine or steam-pump design; boiler-plate and structural steel experience desirable. Location Pa. X-1213.

INSTRUCTOR for state university, preferably with previous teaching experience in theoretical mechanics and mechanics of materials. Location South. X-1214.

SALES ENGINEER by company selling heat-insulating materials on national scale. Present openings New York and Chicago. Progressive men with some previous selling experience. X-1215.

RECENT GRADUATE MECHANICAL ENGINEER to take course of training with well-established company manufacturing mechanical stokers. Applicant should have pleasing personality and be particularly interested in combustion work. Opportunities for promotion to sales or engineering work. X-1222.

INSTRUCTOR in engineering extension division with good extensive-shop experience in automobile-repairing to assist in developing and preparing correspondence text material on automobile repairing and related subjects. Prefer man with some writing experience. Position temporary but good man can develop permanent connection. Location, Mid-West. X-1227.

COMPETENT STEAM-HEATING AND VENTILATING ENGINEER with broad experience and capable of handling layouts and specifications for all types of buildings, including residences, factories, churches, theatres and schools. Applicant should know building construction and be able to develop heating and ventilating plans in conjunction with architect. Location Rhode Island. Give full particulars regarding education and experience. X-1231.

SALES ENGINEER with experience in selling. Preferably 25 to 35 years old. Neat appearance. Willing to work hard for big possibilities; several evenings a week to 8:30. Must have initiative, be aggressive, have clean record, and be good salesman. Former officer preferred. It is not necessary to have sold real estate. The right man can pick up the essentials in a few days. Leads are furnished. Location New York City. X-1232.

SUPERINTENDENT for plant manufacturing ice, creamery products, such as butter, cheese, ice cream and cereal beverages, also distributing milk. Must be experienced and capable of handling men. Knowledge of Spanish and experience as salesman desirable. Give full particulars including salary required in first letter. X-1235.

PRODUCTION ENGINEER for company manufacturing light-gage steel tubing. State education, age and experience. Location Ohio. X-1271.

RESEARCH ASSISTANT for Diesel engine and heat treating problems. Should have some training, if possible, along metallurgical lines, and be able to handle German. Latter not an absolute requirement. Location New York State. X-1277.

SOAP COMPANY having new $50,000 plant and manufacturing special soaps that are meeting with good sale, desires to secure services and cooperation of a man with analytical and manufacturing knowledge of soaps, oils, softeners, etc. used in silk, wool & cotton textile mills. To one who can guarantee business on softeners and textile-finishing materials good commission beside salary is offered, and chance of receiving liberal interest in business if applicant makes good. X-1275.

DESIGNING DRAFTSMAN, bright, keen, well-equipped man, now actively engaged in designing printing-press machinery, whose references will disclose successful accomplishments in his work in printing-press machinery in last 10 years. Must be intimately and familiarly well versed in present American styles of printing-press machinery, not only composing-room tools but all that enters into press-room equipment. Applicants must furnish names of three printing-press machine builders, age, present place of occupation, whether married or single. Salary and promotion are high and rapid to the proper applicant. Location Penna. X-1281.

ENVELOPE FACTORY production superintendent, opening for experienced, versatile, mechanical man, qualified to take charge of envelope and paper-bag factory in New York, state details, age, salary, etc. X-1327.

MECHANICAL ENGINEER for engineering and construction supervision of 5 small wood-burning, steam-driven electric-generating power plants, supplying energy for operating construction equipment. Irrigation development northeastern Brazil. Salary $400 a month less $45 living expenses. Transportation New York and return. X-1299.

YOUNG MAN with technical education, out of college for about two years to sell power-plant and line-shaft equipment, preferably along engineering lines. Home should be within short distance of Springfield and he should be willing to sell on small salary, plus commission. Application by letter stating age, education and experience. Location, Mass. X-1298.

MILL FOREMAN. Young college graduate with

some years' experience in practical cyanide mill work, especially on grinding. Must speak Spanish. The more chemistry he knows the better. The man must be mechanically inclined and competent to see that his machinery including steam plant is properly maintained. Above all he must have gift of the "open eye" and be willing and capable of staying on the job. Plant consists of crushing rolls, tube mills, Dorr Thickens and Flotation tanks of special design, rubber conditioning and packing equipment, including vacuum driers. Mill and living conditions are exceptionally clean and comfortable. Prospects for working into superintendency would be, for right man, excellent. Furnished quarters for either married or single man, with lights, water and fuel, will be furnished. Will not consider anything in way of contract or special agreement beyond customary 30 days' notice. State age, education and experience. Location, Mexico. X-1300.

ASSISTANT PROFESSOR OF HYDRAULICS. Must have experience in hydraulic laboratory investigations and be competent to take charge of laboratory. Location Northwest. X-1320.

MEN AVAILABLE

The large number of requests to insert notices under this heading makes it necessary to limit the number of words in each notice to 20 so that as many members as possible may be accommodated.

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

Notices for "Mechanical Engineering" are not acknowledged by personal letter; unless the applicant is otherwise advised, his notice will appear in the issue following its receipt.

Correspondence relating to replies to advertisements will be held in the Service Bureau for one month only.

TIME-STUDY ENGINEER, 20 years' practical experience, tool-maker, instrument-maker and time-study work. Desires executive factory position, interchangeable parts. SM-6863.

SALES ENGINEER, acquainted with manufacturing and automotive industries in Ohio, Ind., and Mich., wishes to connect with manufacturer of ball or roller bearings. 10 years' experience in that line. SM-6864.

WIDE-AWAKE EXECUTIVE, 37, on maintenance and purchasing. Energetic, resourceful organizer and superintendent; 15 years' experience general contracting and engineering business New York City. Fine references. SM-6865.

PLANT OR WORKS ENGINEER, age 34; 12 years' experience planning, construction and maintenance large industrial plants, at present, plant engineer with large concern. Would consider similar position with larger concern or assistant to manufacturing executive. SM-6866.

MEMBER with general experience in office, shop and field, specializing in power-plant and mill work and last 10 years checking Diesel engine designs, desires position. Reference. SM-6867.

FACTORY MANAGER, 18 years' manufacturing experience. (8000 men.) Practical mechanical engineer, organizer and result getter. Now available. References A-1. Michigan preferred. SM-6868.

MECHANICAL ENGINEER with highest practical experience in machinery and tools, estimator, able to obtain orders for heavy machine-tool work. Commission basis. SM-6869.

MANUFACTURING AND BUSINESS EXECUTIVE, at present chief engineer of large corporation, wishes to make change; technical graduate, 36, broad experience in design, production factory and business administration. SM-6870.

MECHANICAL ENGINEER, graduate; also graduate commercial college, speaks and writes French and Greek. Long experience in marine engineering. Construction or maintenance work, will go anywhere. SM-6871.

MECHANICAL ENGINEER, B.S., M. I. T., design experience on automatic machinery for sheet-metal products, practical shop experience, have prosecuted patents. Preference, assistant to executive. SM-6872.

PRODUCTION EXECUTIVE, graduate engineer; 10 years on labor wage payment, production and stock control, tool and factory layout, production costs; 33; married. SM-6873.

MECHANICAL ENGINEER, technical graduate, 7 years' comparatively broad engineering executive experience in automotive industries covering rubber products, aeronautics, motor cars and trucks. Will go anywhere, preferably Middle West. SM-6874.

COMBUSTION EFFICIENCY ENGINEER, graduate M. I. T. and U. S. N. Steam Engineering School. Marine License; 8 years' steam equipment handling, valuation. Author technical papers. Eastern preference. Age 31. SM-6875.

ENGINEER, 33, experienced in mechanical, marine, and combustion work. Philadelphia location preferred. SM-6876.

REFRIGERATING ENGINEER, experience absorption, compression and raw-water plants, using high and low-pressure systems. Will accept position with manufacturing or operating company. SM-6877.

SALES ENGINEER with New York office, will represent manufacturer on commission basis. SM-6878.

ASSISTANT TO BUSY EXECUTIVE or INDUSTRIAL ENGINEER, graduate M. I. T. American, 32, married. Experience in special investigations, manufacturing standards, production problems, graphical analyses, time studies and costs. SM-6879.

DRAFTSMAN, Ranken Trade School Graduate, age 23; 5 years' experience general work. I. C. S. student at present. Location St. Louis, Mo. SM-6880.

ENGINEER, Assoc. A.I.E.E. desires position construction work, maintenance or operation. Experience a.c. and d.c., 12 years' practical. At present superintendent construction dept. of large electric company. SM-6881.

ASSISTANT MANAGER, FOUNDRY AND MACHINE COMPANY, now employed, age 33, married; 15 years' practical experience. Business, production engineering. Pittsburgh or vicinity. Present salary $3600. SM-6882.

SUPERINTENDENT OF POWER, desires connection with large manufacturing or Public Service company. Expert-turbines, condensers and boilers, also electrical equipment. SM-6883.

MECHANICAL ENGINEER, experience in machine design, can follow design from drafting room through erection. Technical and practical. Familiar with engines, boilers and power-house problems. Location optional. SM-6884.

DESIGNING ENGINEER, 18 years' experience, good executive, automatic machinery, general engineering, inventive. Salary $3000. SM-6885.

FACTORY SUPERINTENDENT OR PRODUCTION MANAGER, 16 years' experience in press work and metal working machinery. Thorough knowledge of modern production methods; close observer of costs. SM-6886.

MECHANICAL ENGINEER and DRAFTSMAN, age 28, Brooklyn Poly. graduate, 6 years' experience on power plants of battleships, desires connection with consulting engineer or industrial organization. SM-6887.

MECHANICAL AND SALES ENGINEER, 36. Broad experience design, production and sale hydraulic equipment, pumps, gas engines and transmission machinery. Can handle correspondence, estimating, installation work. SM-6888.

MECHANICAL ENGINEER, 28, R. P. I.; 3 years' experience Diesel electric, erection testing, operation; 1 year shipbuilding; executive ability. Location immaterial. SM-6889.

DESIGNING ENGINEER, 18 years' experience, bridge shop, steel-mill maintenance, machinery bridge and structural steel, by-product coke-oven apparatus, steam-power plants, etc. Reasonable salary. SM-6890.

MECHANICAL ENGINEER, 18 years' experience maintenance, development equipment and designing of special machinery and tools. Speaks German and Russian fluently. Familiar with European trade. SM-6891.

MECHANICAL ENGINEER, Cornell; 8 years' experience chemical and metallurgical lines, on plant design, construction, maintenance, operation, sales, purchasing, Executive work. Available soon. SM-6892.

GRADUATE M.E., age 31; 10 years' experience manufacture heavy equipment; now chief engineer corporation, desires change. Present salary $5000 year. SM-6893.

PURCHASING ENGINEER, executive; estimating, 18 years' steel-mill experience mechanical-engineering department; handle work, chief or assistant chief engineer; employed. SM-6894.

SALES OR TECHNICAL POSITION, technical graduate, age 32, at present mechanical electric engineer for consulting firm; making specialty power-plant efficiency. Boiler, steam, gas-engine, electrical, and artificial-gas experience. SM-6895.

MECHANICAL ENGINEER AND PRODUCTION EXECUTIVE, 5 years' mechanical drafting and engineering; 4 years' production executive on power-press product. Boston or vicinity. SM-6896.

DESIGNING ENGINEER, age 31; 13 years' broad experience mechanical and industrial engineering layout, development, investigation and design. Executive, board or sales position; location immaterial. SM-6897.

PRODUCTION ENGINEER EXECUTIVE, 35; 13 years' experience, production control, planning, scheduling, rate setting, tool design and manufacture. Cornell M.E. SM-6898.

INDUSTRIAL ENGINEER, experienced in organization, cost and production. Can show results obtained. Age 26. Technical graduate. Salary $3600. SM-6899.

SALESMANAGER, well acquainted in New York district, also Philadelphia and New England, desires, power plant or other mechanical line. SM-6900.

POWER-PLANT DESIGNING ENGINEER, 18 years' experience central stations and isolated plants. Technical graduate. Age 38. Immediately available. Eastern location. SM-6901.

ASSISTANT TO EXECUTIVE, SALES, or CHIEF ENGINEER, Harvard graduate; 10 years' experience hoisting, conveying, power-transmission apparatus. Capable engineer and executive. SM-6902.

DESIGNING ENGINEER, American, age 32, married; 16 years' experience mechanical design, calculation and investigation. Specializing in railway rolling-stock. SM-6903.

POWER AND CONSTRUCTION EXECUTIVE, technical graduate; 13 years' experience steam-electric power-plant design, construction, operation, management. Recently completed pulverized-coal installation. Available immediately. SM-6904.

DESIGNING ENGINEER, 7 years' experience on mechanical work, would like to start as sales engineer with good future prospects. SM-6905.

MECHANICAL AND AUTOMOTIVE ENGINEER, 34, single, desires connection with company planning business in Latvia (Riga) or Russia. Speak both languages. SM-6906.

SUPERINTENDENT OR PRODUCTION ENGINEER, practical shop experience, wide experience manufacturing machine tools, automobiles and other productions requiring interchangeable parts; location immaterial. SM-6907.

MECHANICAL EXECUTIVE, engineer and practical mechanic; 20 years' extensive experience manufacturing and construction; made my own way in world. SM-6908.

MECHANICAL ENGINEER, 28, graduate University of Cincinnati, coöperative engineering course; practical shop experience with technical education; experienced in machinery sales, service and purchasing. SM-6909.

ASSISTANT TO SUPERINTENDENT of boiler mfg. concern. Technical graduate; 10 years' experience in operation, inspection, and construction. Salary secondary. Location Mid-West. SM-6910.

DESIGNER, 28, married, technically trained; 6 years' experience designing special automatic machines, tools, jigs, fixtures, gages, punch and dies for quantity productions. Location Metropolitan section. SM-6911.

MECHANICAL ENGINEER, technical, 14 years' machine ship and design experience. Executive position with opportunities. Age 30, married. Location Boston or vicinity. SM-6912.

MECHANICAL ENGINEER, graduate M. I. T., age 29. Experience in appraisal, design and manufacturing, sales engineering; position in Carolinas or Georgia. SM-6913.

MECHANICAL AND POWER ENGINEER, age 30, single, technical graduate; B.S. and M.E.; 8 years' experience chemical, machine shop, metallurgy, sugar engineering, industrial, power-plant operation, design, layout. Executive and business ability. SM-6914.

MECHANICAL ENGINEER, M. I. T. graduate; age 24, married; steam power, materials inspection, and executive experience; desires position with future. Location South, West, or South America. SM-6915.

EXECUTIVE, graduate mechanical engineer, 30, charge construction progress and costs, purchase, inspection variety mechanical apparatus; charge design high pressure-temperature process; available January. SM-6916.

MECHANICAL ENGINEER, technical graduate, age 37; executive experience design, construction, maintenance, improvement power plants and fac-

tories; production industrial engineering, machine shop, etc., interchangeable parts mfg. SM-6917.

INDUSTRIAL ENGINEER OR EXECUTIVE, age 32. Experience: foreman, plant engineer, assistant plant manager, industrial engineer, with nationally known professional firm. SM-6918.

GRADUATE, Rutgers 1921 M.E. course, wishes position with good opportunity for advancement. Preferably in or near Newark, N. J. Age 23, unmarried. SM-6919.

TOOL DESIGNER, specializing in punch, die, fixture, and machine work. Also experience in structural and plant layout; 6 years' experience. Age 26. Location Connecticut. SM-6920.

PRODUCTION MANAGER would like position with company in Hudson Valley with opportunity for investment with services. SM-6921.

SUPERINTENDENT, machinist tool maker by trade, technical graduate, wide experience organizing, planning, and handling help in plants manufacturing interchangeable parts. Age 36. Best references. Eastern territory. SM-6922.

INDUSTRIAL ENGINEER, M.E., age 31, now employed, desires position as assistant to manager in either job-standardization work or employee-foreman training. SM-6923.

INDUSTRIAL HEATING ENGINEER, connection with plant or engineering firm, to improve methods of heating and handling ferrous or non-ferrous metals. SM-6924.

ENGINEER, college graduate; 15 years' experience planning, maintenance, systematizing, standardizing, shop, office, drafting room, desires position as plant or sales engineer or instructor. SM-6925.

TECHNICAL GRADUATE, with electrical and steam-power plant experience and now employed as power superintendent, desires change. Sales preferred. SM-6926.

ENGINEERING EXECUTIVE, Cornell graduate, 17 years' experience public utility and manufacturing. Business Administration course La Salle University. Salary $5000. SM-6927.

ENGINEER, 38, employed. 15 years' experience machine shop, tool making, drafting, costs, production, tool design. Position as industrial engineer, superintendent, assistant to manager. New York preferred. SM-6928.

TECHNICAL GRADUATE ENGINEER, now employed wishes executive position, preferably Florida or other Southern State; 20 years' design, construction management power stations, industrial work, etc., embodying mechanical, civil and electrical engineering. SM-6929.

SALES ENGINEER, young man, mechanically educated, will consider position with reliable house manufacturing mechanical products or selling mechanical services. SM-6930.

SALES ENGINEER, 15 years' experience air compressors, rock drills, hoists, boilers, etc. Sales, business, executive ability. SM-6931.

MECHANICAL ENGINEER, 1921, age 24. 4 years' shop experience, production, time-study; permanent location as assistant to executive, or as consulting engineer on experimental and on research work. SM-6932.

MEMBER seeks professorship in high grade school. Broad teaching, writing, and publicity experience. Age 37. $5000. SM-6933.

MECHANICAL ENGINEER, Graduate. Tool maker by trade; 10 years' tool making, drafting, and tool engineering. 1 year sales and service experience. Desires position as superintendent or master mechanic. Age 31. Married. SM-6934.

PULVERIZED FUEL ENGINEER, 10 years' experience here and abroad in design, construction, operation of complete powered coal plants and furnaces for all metallurgical purposes utilizing all fuels. SM-6935

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER DECEMBER 29, 1921

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically by states, then alphabetically. Unless objection is made to any of the candidates by Dec. 29, 1921 and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

DOUGAN, CHARLES E., Chief Draftsman, Woodward Iron Co. Woodward

GATCHELL, EDWARD S., Salesman, Machinery Department, Moore-Handley Hardware Co., Birmingham

MOORE, WILLIAM D., Works Manager, American Cast Iron Pipe Co., Birmingham

PETTIT, HARRY P., Foreman, Alabama By-Product Corp., Birmingham

California

BOWER, HAROLD G., Test Operator, Standard Oil Co. of California, El Segundo

CLAUSEN, ARTHUR W., Chief Engineer, Pacific Coast Steel Co., South San Francisco

COOK, WILLIS D., Engineer, Henneuse Tractor Co., Sacramento

GRAU, HERBERT E., Chief Tool Designer, Union Tool Co., Torrance

HANSON, CLARENCE F., Draftsman, Standard Oil Co. of California, El Segundo

HEBERT, ATLAS J., Structural Draftsman, Western Pipe & Steel Co., Los Angeles

MARTIN, ARTHUR E., Design Engineer, Standard Oil Co. of California, El Segundo

SMITH, ROBERT B., Test Operator, Standard Oil Co., El Segundo

VAN HOUTEN, JOHN G., Consulting Engineer, Roy C. Seeley Co., Los Angeles

Colorado

LOCKWOOD, FRANK A., Production Engineer, The Denver Engineering Works Co., Denver

Connecticut

BARNES, HERBERT C., Consulting Engineer, P. & F. Corbin Division, American Hardware Corp., New Britain

BONNETT, J. CALVIN, Superintendent, The Eastern Machinery Co., New Haven

KENWORTHY, CHARLES F., President, Charles F. Kenworthy, Inc., Waterbury

LANZ, FREDERICK J., General Production Foreman, Robert N. Bassett Co., Shelton

McEWEN, ERNEST J., Machine Design, Stillman Shaw & Associates, Hartford

MORGAN, PERCY C., Assistant to Chief Designer, Norwalk Iron Works Co., South Norwalk

STETSON, RALPH W., Assistant Division Engineer, Lane Construction Corp., Meriden

WETHERBEE, CHARLES F., New Haven

District of Columbia

CLEVE, HARRY C., Instrument Maker, United States Naval Observatory, Washington

HUNT, EDWARD E., Secretary, The President's Conference on Unemployment, Washington

JOHNSTON, ROBERT S., Engineer Physicist, Bureau of Standards, Washington

Florida

KURTZ, CHESTER A. R., Assistant Engineer, Tampa Electric Co., Tampa

PEACOCK, WORTH C., Consulting Engineer, Sebring

Illinois

BRENNE, ARILD M., Engineering Work, W. H. Miner, Chicago

BRYANT, FRANK L., Calumet Chemical Co., Joliet

HAWKINS, ANDREW B., Flintkote Co., Chicago Heights

LAGER, ERIC W., Engineer, Swift & Co., Chicago

LAIST, THEODORE F., Consulting Engineer and Chicago Representative, National Lumber Manufacturers Assn., Chicago

LASKER, GEORGE, Managing Partner, Lasker Iron Works, Chicago

WINDES, THOMAS G., Jr., Manager, Railroad Department, International Filter Co., Chicago

Indiana

BAUR, OSCAR, President, The Baur Carbonic Co., Indianapolis

CLEVELAND, WARREN E., Teacher of Mechanical Drawing and Mathematics, Arsenal Technical High School, Indianapolis

DAVIDSON, WILLIAM A., Chief Engineer, United Paperboard Co., Wabash

DONOVAN, EDWARD T., Purdue University, Lafayette

SOLBERG, HARRY L., Assistant in Mechanical Engineering, Purdue University, Lafayette

STUART, RALPH A., Engineer, Shourds-Stoner Co., Inc., Terre Haute

Iowa

ARDUSER, LEON P., Instructor, Iowa State College, Ames

Louisiana

FRIEND, JOHN H., Supervising Engineer, Great Southern Lumber, Bogalusa Paper Co., Bogalusa

Maryland

ANDRAE, KARL H., Baltimore Tube Co., Baltimore

EDEL, WALTER L., Baltimore

YOUNG, REAGAN H., Engineer and Draftsman, Woodberry Mills, Inc., Baltimore

Massachusetts

BAUSMAN, A. LINTON, Works Manager, National Equipment Co., Springfield

DE LA MATER, R. GRIFFIN, Instructor in Mechanical Engineering, Worcester Polytechnic Institute, Worcester

FENAUX, PIERRE P., Engineer, General Electric Co., Lynn

FLAHERTY, EDWARD B., Mechanical Draftsman, Revere Sugar Refinery, Charlestown

MACKINNON, CHARLES, Assistant in Mechanical Engineering, Massachusetts Institute of Technology, Cambridge

MORRELL, JOSEPH C., Student, Massachusetts Institute of Technology, Cambridge

PIROOMOFF, G. S., Assistant, Mechanical Engineering Department, Massachusetts Institute of Technology, Cambridge

SILER, WILLIAM A., Chief Draftsman, Westinghouse Electric & Manufacturing Co., Springfield

WALTON, ALBERT, Jr., Assistant Plant Manager, Bateman & Companies, Inc., Chicopee Falls

Michigan

ARONSON, ARTHUR V., Delta County Road Commission, Escanaba

AYERS, MARQUIS H., Wholesale Coal Salesman & Development Engineer, Ayers & Lang, Detroit

RAY, WILLIAM H., Chief Mechanical Engineer, Weis Fibre Container Corp., Monroe

RICHMOND, EARNEST A., General Engineering Practise, Battle Creek

WRIGHT, BENJAMIN F., Chief Draftsman, Wright-Fisher Engineering Co., Detroit

Missouri

LANE, GEORGE W., Manager, Specialty Department, Midwest Piping & Supply Co., St. Louis

LEHMAN, PAUL W. M., Mechanical Engineer, Cupples Co., St. Louis

MUELLER, BEN H., Sales Engineer for Building and Industrial Equipment, St. Louis

NEUBECK, WILLIAM H., District Manager, Alvey Manufacturing Co., St. Louis

ROBERTSON, JOHN M., Mechanical Engineer, E. K. Campbell Heating Co., Kansas City

Montana

GOLDSMITH, FREDERICK W., Principal Assistant to General Manager, Montana Southern Railway, Wise River

New Hampshire

GREEN, ARTHUR B., The Parker-Young Co., Lincoln

New Jersey

ALEXANDER, ALBERT N., Industrial Engineer, Empire Tire & Rubber Co., Trenton

BAERENRODT, EUGENE F., Superintendent, Gamon Meter Co., Newark

HARRIS, JOHN P., Captain, Ordnance Department, United States Army, Picatinny Arsenal, Dover

HOEVEL, HERMAN F., Secretary & General Manager, Hoevel Manufacturing Corp., Jersey City

JUST, RAYMOND H., Marion Power Station, Public Service Electric Co., Jersey City

LARSEN, HENRY E., Hyatt Roller Bearing Co., Harrison

LINTER, CHARLES H., Foreman of Repairs, New York Edison Co., Jersey City

MacDONALD, JOHN A., Assistant Engineer, Public Service Electric Co., Newark

MORRIS, RICHARD H., Worthington Pump & Machinery Corp., Harrison

PELLETT, STAATS M., Hamburg

POOR, EDWARD E., Jr., Plant Manager, Passaic Print Works, Passaic

ROBERTSON, EDWIN A., Chief Engineer, Splitdorf Electric Co., Newark
ROLL, JOHN, Assistant Mechanical Engineer, The Singer Manufacturing Co., Elizabethport
ROTH, CLARENCE H., Chief Draftsman, Heater, Lamp & Light Fixture Department, Welsbach Co., Gloucester
SCHELL, FREDERIC B., JR., Erector, Worthington Pump & Machinery Corp., Harrison
SCHROEDER, WALTER R., Mechanical Draftsman, Standard Oil Co., Linden
SHEEHAN, THOMAS C., President, Durham Duplex Razor Co., Jersey City
SMITH, LAWRENCE V., Cadet Engineer, Public Service Electric Co., Newark
STEINMANN, WALTER, Hyatt Roller Bearing Co., Harrison
THORNTON, ARTHUR F., Engineer in charge, Henry R. Kent & Co., Rutherford
VAN SYCKLE, ALVAH L., Hackettstown

New York

ABBOTT, JAMES, JR., Laboratory Engineer, Western Electric Co., New York
ACKERMAN, GARRETT J., Mechanical Engineer, Ford Instrument Co., New York
AHLERS, WILLIAM H., Vice-President & Manager, Buffalo Hoist & Derrick Co., Buffalo
ALLEN, HOWARD G., Designer & Mechanical Engineer, The Philpott & Leuppie Co., Niagara Falls
AVERY, WHITNEY K., Holmes Electric Protective Co., New York
BARTLETT, EDWARD E., President, The Bartlett Orr Press, New York
BRANDEL, MYRON P., Engineering Department, Buffalo Forge Co., Buffalo
BUSSEY, ROBERT E., Chief Engineer, Hyco Fuel Products Corp., New York
CLAPP, LAWRENCE R., Industrial Engineer, New York
DIRKES, ROBERT F., Western Union Telegraph Co., New York
FELDMAN, PHILIP J., Brighton Beach, Brooklyn
FETHERSTON, JOSEPH A., Production Manager, Huyler's, New York
GAMBLE, HARRY G., Assistant Engineer, Multi Vane Construction Co., Inc., New York
GINGER, RAYMOND W., Mechanical Engineer, American Chicle Co., Long Island City
HINKLE, JAMES B., Mechanical Draftsman, Department of Plant & Structures, St. George, Staten Island
KING, ALFRED F., Factory Manager, J. B. King & Co., New Brighton, Staten Island
KRINER, CLARENCE M., Sales Engineer, Alberger Pump & Condenser Co., New York
McENANEY, PETER F., Chief Engineer, Superior Meter Co., Brooklyn
McINTYRE, JOHN, Draftsman, General Electric Co., Schenectady
MALONEY, MICHAEL J., Superintendent, The Rail Joint Co., Troy
PURDIE, DAVID J., District Sales Manager, Builders Iron Foundry, New York
RAUSKE, PAUL, Designer Special Automatic Machinery, American Everready Works, National Carbon Co., Long Island City
RIS, KENNETH B., Brooklyn
RODMAN, MURTON J., Buffalo Forge Co., Buffalo
ROSSMASSLER, CARL, Assistant Professor of Machine Design, Cooper Union, New York
SAMMONS, CHARLES H., Salesman, Warren C. Drake, New York
SIEGAL, JACK, Brooklyn
SPADAVECCHIA, NICHOLAS W., Western Electric Co., New York
SWARD, CECIL W., Salesman, Griscom-Russell Co., New York
THEURKAUF, EDWARD A., F. A. Marsily & Co., New York
TWITCHELL, CLARENCE H., Chief Draftsman, Atmospheric Nitrogen Corp., Syracuse
VAUGHN, KARL F., Research Engineer, C. P. Perin & S. M. Marshall, New York
WARD, NAIRNE F., Instructor in Machine Design, Sibley School of Engineering, Cornell University, Ithaca
WIGHTMAN, DAVID C., Chief of Standards Department, Library Bureau, Ilion

North Dakota

COOPER, WATSON C., Department of Shops, University of North Dakota, Grand Forks

Ohio

CAMPBELL, IVOR S., Professor of Mechanical Engineering, Ohio Northern University, Ada
CARNEGIE, ANDREW, Assistant Superintendent of Power, Pennsylvania Ohio Power & Light Co., Youngstown
CLARK, ELMER C., Tool Control Supervisor, National Supply Co., Toledo
EASON, SAMUEL H., Student, Hiram College, Hiram
LANG, HENRY T., Chief Engineer, Electric Vacuum Cleaner Co., East Cleveland
LEZIN, BEN B., Cleveland
POMEROY, CHARLES R., Mechanical Engineer, Rathbun-Jones Engineering Co., Toledo

Oklahoma

BRADLEY, ROBERT O., President, Robert O. Bradley & Co., Lawton
CAMPBELL, HARVEY B., Field Engineer, The Diamond Gasoline Co., Nowata
GULLEY, HENRY A., Oklahoma Power Co., West Tulsa

Oregon

PHILLIPS, MARK C., Associate Professor of Mechanical Engineering, Oregon State Agricultural College, Corvallis

Pennsylvania

BATE, HERBERT, New York Manager, Lancaster Iron Works, Inc., Lancaster
BEAR, GROVER E., Sales Engineer, Fuller Engineering Co., Allentown
BLENKO, WALTER J., Pittsburgh
CHASE, EDWARD D., Assistant to General Manager, United Filters Corp., Hazleton
COPE, REX LA C., Assistant Chief Engineer, Vulcan Soot Cleaner Co. Du Bois
ELIAS, JUSTIN A., Mechanical Draftsman, Day & Zimmermann, Inc., Philadelphia
FELVER, HOWARD C., Engineering and Contracting, H. C. Felver, Pottsville
FOGG, WILLIAM R., Secretary, The Ballinger Co., Philadelphia
HELSEL, WILLIAM G., Assistant Manager, Standard Steel Car Co., Butler
JOHNSON, OSCAR A., Plant Engineer, American Engineering Co., Philadelphia
KUNKEL, GEORGE M., Instructor in Mechanical Engineering, Bucknell University, Lewisburg
NEWKIRK, WALTER M., Vice-President and General Manager, William & Harvey Rowland, Frankford, Philadelphia
O'CONNOR, JAMES J., Chief Engineer, Oil City Boiler Works, Oil City
OSBORN, JACOB R., President & General Manager, Osborn Machine Co., Du Bois
SNYDER, JOHN A., Chief Inspector, Pittsburgh Department, Steam Boiler Inspection & Insurance Co., Pittsburgh
THORPE, JOHN R., Philadelphia
TYLER, JOHN C., Assistant Plant Engineer, The Baldwin Locomotive Works, Philadelphia
WEAVER, PAUL A., Instructor in Machine Shop, Bucknell Univ., Lewisburg
WILSON, BENJAMIN J., Instructor in Mechanical Engineering, Bucknell University, Lewisburg

Washington

McMINN, BRYAN T., Instructor in Mechanical Engineering, University of Washington, Seattle

Wisconsin

SAECKER, CARLETON E., Engineer, Appleton Machine Co., Appleton

Canada

ALLCUT, EDGAR A., Associate Professor of Thermodynamics, University of Toronto, Ont.
LAURIE, ALBERT, Owner, Laurie & Lamb, Montreal, Que.
McCRADY, LOUIS DEB., Chief Engineer, Canadian Explosives, Ltd., Montreal, Que.
SPENCER, ALEXANDER C., Engineer in charge, Sarnia Refinery, Imperial Oil, Ltd., Sarnia, Ont.
VAN BENSCHOTEN, JAY, Canadian Manager, Wallace & Tiernan Co., Inc., Toronto, Ont.

Cuba

WOLFF, IRVAN J., Assistant Superintendent, American Sugar Refining Co., Central Jaronu, Camaguey

Germany

MUNROE, ROBERT K., Officer in charge of Roads and Public Utilities, Headquarters of American Forces in Germany

Hawaii

APOR, EMIL L., Assistant Engineer, Catton, Neill & Co., Honolulu

India

VISWANADHAM, M., Professor of Mechanical Engineering, National College, Masulipatam

Porto Rico

SETCHELL, HORACE E., Professor of Mechanical Engineering, University of Porto Rico, Mayaguez

South America

KRUGER, PAUL F., Maintenance Engineer, Chile Exploration Co., Chuquicamata, Chile

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE-MEMBER

California

MOELLER, WILLIAM, JR., Assistant General Manager, Midway Gas Co., Taft
SCHMIDT, ARTHUR A., Chief Engineer, Western Precipitation Co., Los Angeles

Delaware

DOWLING, NORTH, JR., Mechanical Engineer, Eastern Malleable Iron Co., Wilmington

New York

KATES, EDGAR J., Assistant Chief Engineer, Power Department, De La Vergne Machine Co., New York,

Ohio

SARGISSON, ZACCHEUS E., Factory Engineer, Boot & Shoe Department, F. B. Goodrich Co., Akron

England

WEBB, CLIFFORD L., Assistant Foreign Manager, Worthington Pump & Machinery Corp., Kingsway, W. C. 2

South America

BRADY, GEORGE S., American Trade Commissioner to Argentine, Uruguay & Paraguay, Buenos Aires, Argentine

PROMOTION FROM JUNIOR

Connecticut

PERRY, RALPH H., Superintendent, The Progressive Manufacturing Co., Torrington

Illinois

GRUNERT, ARTHUR E., Efficiency Engineer, Commonwealth Edison Co., Chicago
THOMAS, JOHN M., General Manager, Thomas Pump Co., Chicago

Massachusetts

STEARNS, WALTER I., Industrial Engineer, Cooly & Marvin, Boston

Missouri

FRAUENS, FRANK H., JR., Member of Firm, W. B. Rollins & Co., Kansas City

New Jersey

DICKEY, RALPH L., Sales Manager & Secretary, New York Wire & Spring Co., Hoboken

New York

COLSTON, ROBERT, Manager, Marine Department, The Griscom-Russell Co., New York
COOKE, EUGENE L., Sales Engineer, Vincent-Gilson Engineering Co., New York
EPPS, FRANK A., Production Manager, Foamite Firefoam Co., New York
LASSITER, R. R., Vice-President & Secretary, Dale Machinery Co., Inc., New York
MAIN, C. CURTISS, JR., Assistant Eastern Manager, Curtis Pneumatic Machinery Co., New York
SMITH, MARSHALL C., Mechanical Engineer, The Barrett Co., New York

Oklahoma

RUSH, EARL S., Research Engineer, Doherty Research Co., Bartlesville

Pennsylvania

ANDERSON, GEORGE B., JR., Selling Agent, Pittsburgh Valve, Foundry & Construction Co., Pittsburgh
BARNABY, RALPH S., Lieutenant, Engineering Department, Naval Aircraft Factory, Navy Yard, Philadelphia
OSGOOD, WENTWORTH H., United States Navy, Pittsburgh
PRENTICE, DONALD B., Professor, Lafayette College, Easton
WALKER, FRANCIS W., JR., Treasurer & General Manager, Beaver Falls Art Tile Co., Beaver Falls

Tennessee

CALLAN, JOHN, Mechanical Engineer, W. E. Biggs Engineering Co., Knoxville

SUMMARY

New applications	165
CHANGE OF GRADING	
Promotion from Assoc-Mem.	7
Promotion from Junior	19
Total	191

October 29, 1921

Making Things

By Edward M. Woolley

Illustrated by W. C. Dexter

MORE men have reached success and wealth through manufacturing activities than through any other branch of business; and to-day, when the country is coming out of its industrial anesthesia, our hopes are centered on the factories.

No matter what jolts manufacturers have had; no matter how many billions have been sacrificed in marked-down inventories; no matter how many dividends have been passed, the commerce of the future must come from our industrial plants.

The business of making things must always invite young men, must offer them the allurement of opportunity with the assurance that if they work with knowledge and intelligence they may reasonably expect to succeed. The field is there:

A young superintendent offered his plan to increase production in exchange for a percentage of the profit

THE SUBJECT OF THE DAY

The eyes of the world today are upon the men who are "making things." Industry—production—men, material, equipment—this is the big field and a great opportunity is open to whoever will learn to understand these things and apply scientific principles to their operation.

The 300,000 manufacturing plants in America are determined to find managers who can eliminate waste and cut the cost of production to meet foreign competition and our own new price levels. They simply *must* get hold of competent Industrial Engineers.

For five years the Industrial Extension Institute has been training ambitious men into able managers and Industrial Engineers. These men gave their energy and three or four hours a week of earnest study and they have succeeded in terms of trebled salaries and big, executive jobs.

The same chance is yours today. It is the ideal moment to strike for a career. The Factory Management Course and Service comes to *your own desk*. It is conducted on the university basis by 60 of the world's most successful and practical Industrial Engineers, Gantt, Steinmetz, Ficker, Roe, Babson, etc. It is an earnest, thorough and complete training for Industrial Engineering, the new and great profession of the day.

We put a coupon at the botton of this page so that you can ask for full information about the Factory Management Course and Service. It does not mean that you are obligated in any way, but it does mean that you are that much nearer an important place in the broad field of industry.

Industrial Extension Institute

9 East 45th Street

New York City

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Industrial Extension Institute
9 East 45th Street
New York City

NAME .....

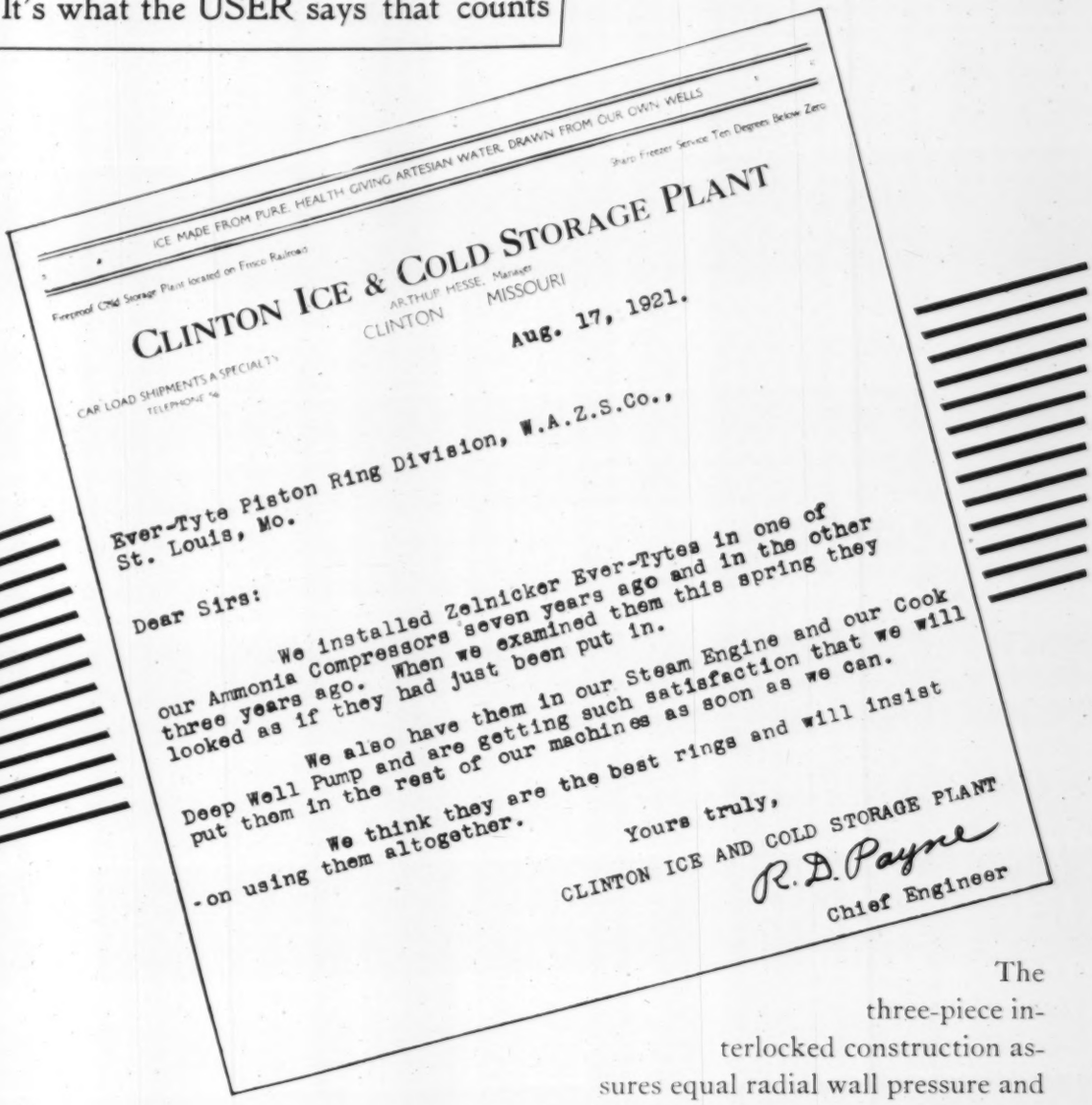
ADDRESS .....

PRESENT POSITION .....

(Mech. Engrg., Dec., 1921)

Seven Years in Service

It's what the USER says that counts



ICE MADE FROM PURE, HEALTH GIVING ARTESIAN WATER, DRAWN FROM OUR OWN WELLS

Fireproof Cold Storage Plant located on Frisco Railroad

Share Freezer Service Ten Degrees Below Zero

CLINTON ICE & COLD STORAGE PLANT

ARTHUR HESSE, Manager

CLINTON MISSOURI

CAR LOAD SHIPMENTS A SPECIALTY

TELEPHONE 56

Aug. 17, 1921.

Ever-Tyte Piston Ring Division, W.A.Z.S.Co.,
St. Louis, Mo.

Dear Sirs:

We installed Zelnicker Ever-Tytes in one of our Ammonia Compressors seven years ago and in the other three years ago. When we examined them this spring they looked as if they had just been put in.

We also have them in our Steam Engine and our Cook Deep Well Pump and are getting such satisfaction that we will put them in the rest of our machines as soon as we can.

We think they are the best rings and will insist on using them altogether.

Yours truly,
CLINTON ICE AND COLD STORAGE PLANT
R. D. Payne
Chief Engineer

The three-piece interlocked construction assures equal radial wall pressure and true circular expansion, thereby permitting a perfect fit to the cylinder wall with a minimum of wall pressure. Long life at maximum efficiency is the natural result.

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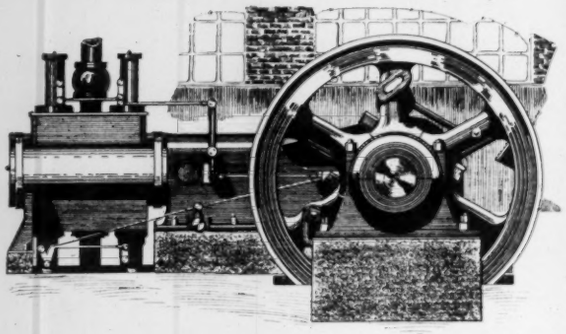

No "Back Talk" from the LENTZ Poppet Valve ENGINE

Springfield, Massachusetts,
November 1, 1921.

Erie City Iron Works,
Erie, Pa.

Gentlemen:

In reply to your favor of the 31st ultimo relative to the Lentz Engine which you installed in our Springfield plant in January 1920, we beg to advise that it is a pleasure to say the engine is very satisfactory.

We are carrying almost a continuous overload of from 20 to 25 percent and there is not any of the "back talk" that we have experienced with other types of poppet valve engines. On the whole we find it quite easy to operate and very economical in steam consumption.

Very truly yours,
THE WILLIAM CARTER COMPANY,
(Signed) Walter Prouty, Chief Engineer.

Every experienced mechanical engineer will appreciate what Mr. Prouty means when he says that he has never had any "Back Talk" from his Lentz Engine. Freedom from the various annoyances that are common with less perfectly constructed engines means a great deal added to the operating efficiency of the entire plant,

Remember, too, that Lentz Engines are very economical of steam; give close regulation; and maintain their original efficiency for an almost unlimited period of years if properly taken care of.

A very complete and well-illustrated catalogue describing the Lentz Engine will be sent promptly on request.

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ONLY STEAM ENGINES
Good Engines only

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They deliver all the power, all the time that you must have it; and perform noiselessly and almost without vibration.
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Let us make three SUGGESTIONS

During this period of post-war re-adjustment, there is a natural tendency to put off buying mechanical equipment except that which is absolutely required; and also to consider *price* rather than *quality* when forced to buy. In this connection, we say "don't" in three suggestions.

DON'T use old machinery that is badly worn. DON'T buy cheap, rather than, good machinery. DON'T buy important machinery without consulting a competent engineer.

Experience has shown us that it is neither economical or safe to do any of these three things; and we advise and serve our clients thoroughly.

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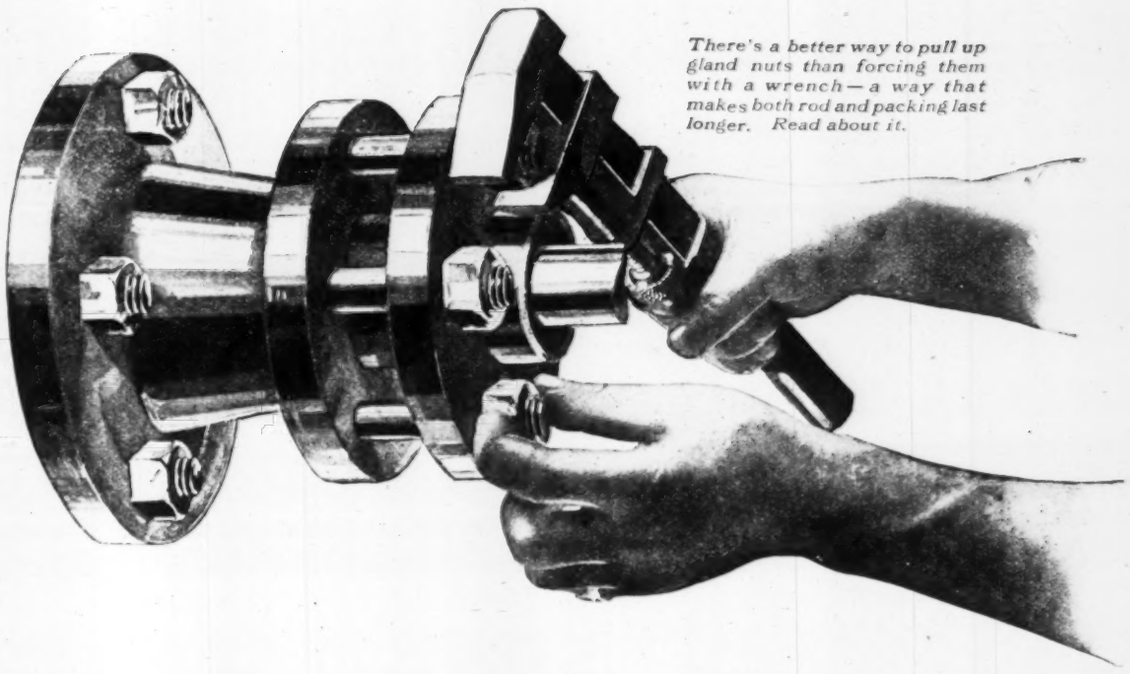

There's a better way to pull up gland nuts than forcing them with a wrench—a way that makes both rod and packing last longer. Read about it.

How do you pull up gland nuts?

With a wrench?

WHEN you pull up gland nuts tight with a wrench, you may stop leakage. But when you've stopped the leak, the packing grips the rod tighter than before — the only reason why inert packing packs at all. But the power required to force the rod through tightly jammed packing and the resulting destructive wear are often more expensive than the leak.

Why not just finger-tight?

You need and should only make the gland nuts finger-tight when you use Johns-Manville Sea Rings. This is because gland pressure is not required to force the Sea Ring against the rod. Sea Rings do not press against the rod except when there is a tendency to leakage past them. But the instant pressure starts to escape a part of each Sea Ring automatically presses against the rod with a force that is proportional to the tendency of leakage—only maximum when necessary, and this maximum is always the minimum required to prevent leakage.

Let the Packing do the Work Automatically

Sea Rings' pliant lips, automatically touching the rod only when necessary to prevent leakage, ease away automatically as the pressure drops.

It's much more economical to pack automatically, with the gland nuts merely finger-tight—just enough to retain the packing in the stuffing box.

Stop needless rod friction with Sea Rings

Sea Rings save power and largely prevent rod and packing wear. For they press against the rod only when the pressure requires it. That's why Sea Rings outlast ordinary inert packing. Ask the nearest Johns-Manville Branch for the Sea Ring Booklet.

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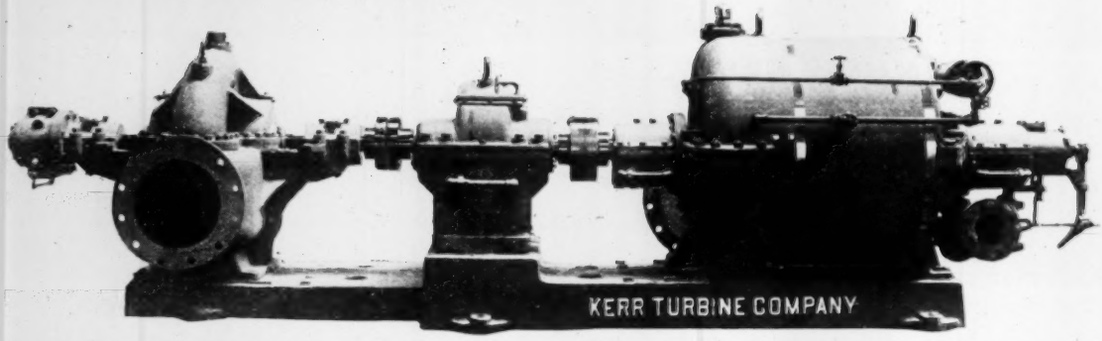

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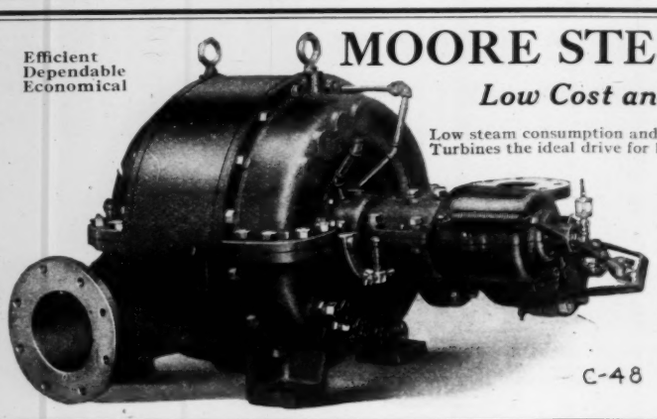

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The maximum speed of the smallest size wheel does not go beyond 5000 R.P.M. They represent the best in steam turbine building. Years of operation have proved them to be economical and dependable.

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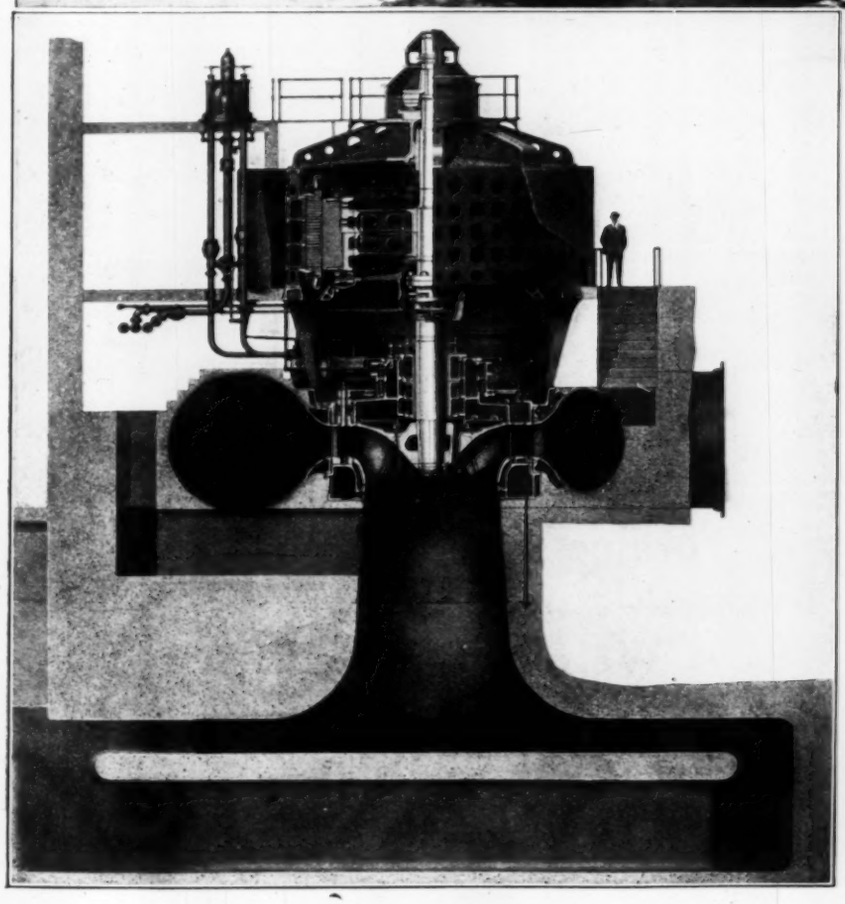

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This machine developed over 93% turbine efficiency on test and 91% from water to switchboard.

This complete hydro-electric machine is a product of the engineering and shop organization which are ready to serve you on any hydro-electric problem.

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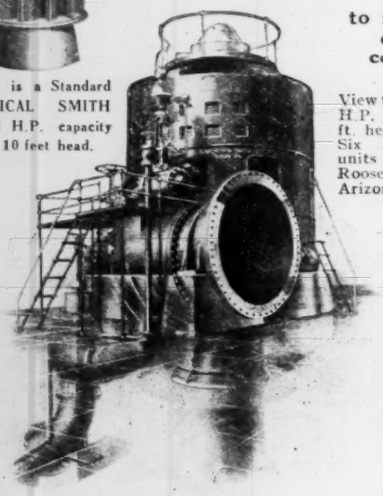
Above is a Standard VERTICAL SMITH of 10 H.P. capacity under 10 feet head.

Both Illustrations Show

SMITH HYDRAULIC TURBINES

to meet vastly different conditions



View to left is a 10,000 H.P. unit under 200 ft. head. One of the Six Smith Turbine units installed at the Roosevelt Dam in Arizona.

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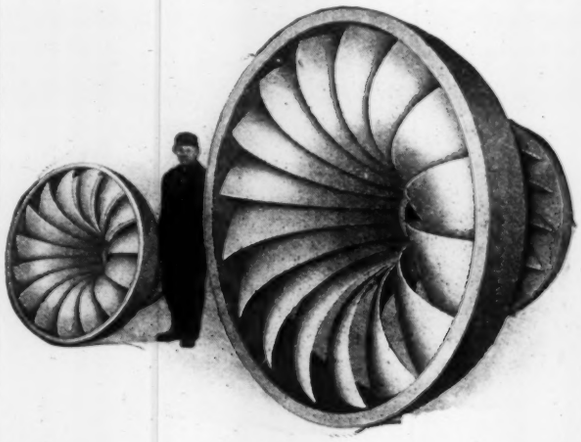

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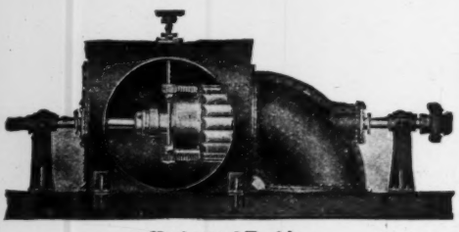

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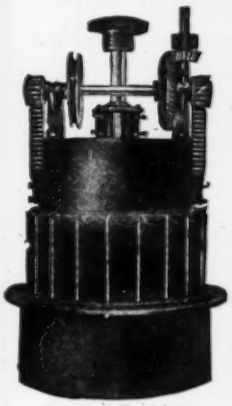

Vertical Turbine

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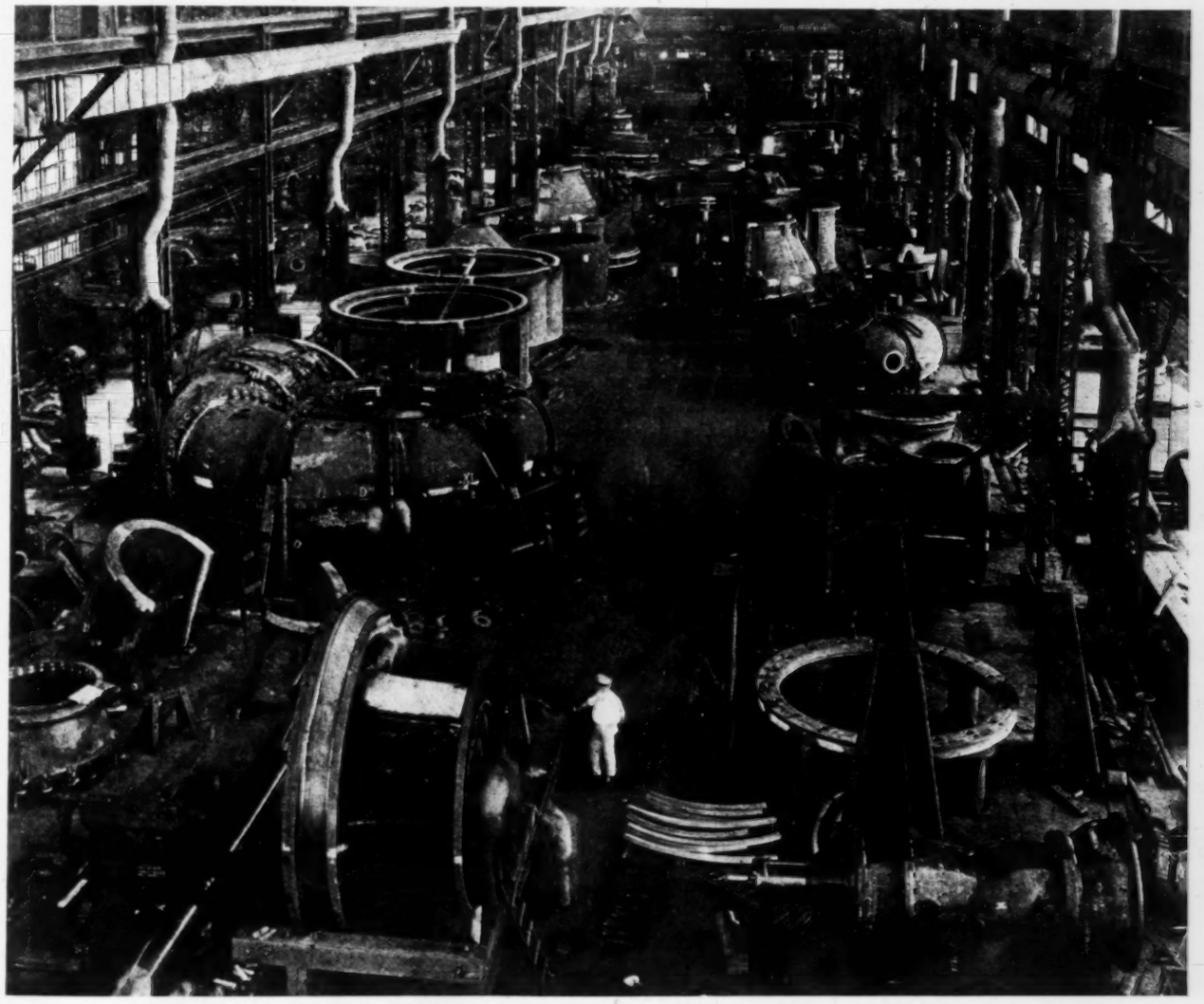

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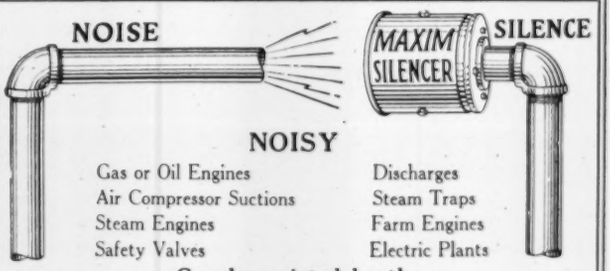

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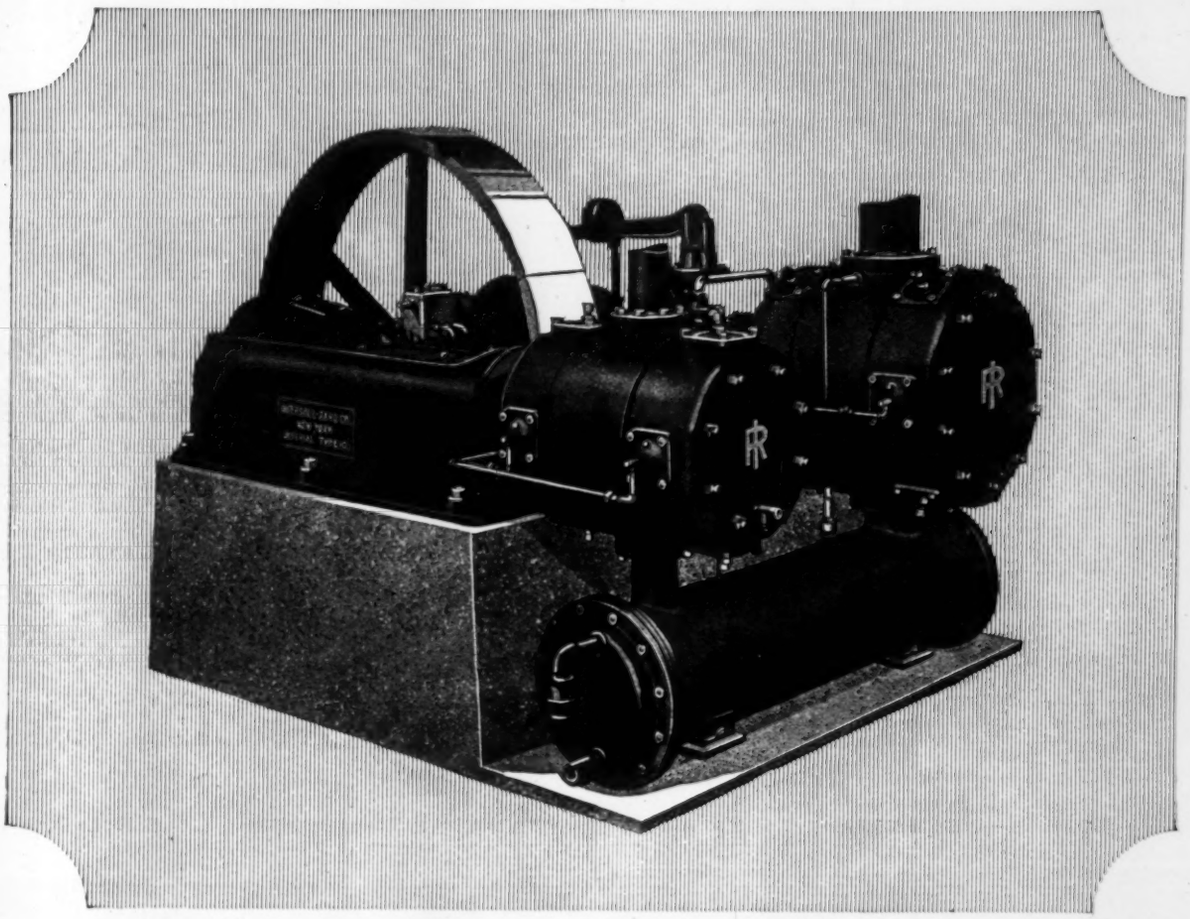

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Only unusual conditions require the same air output at all times during the day or year.

A compressor operates at highest efficiency at full load, but full load is hardly ever the *average* load.

The best way to secure maximum compressor efficiency is to install a compressor which will operate automatically and efficiently at *full load and also at partial loads.*

Our 5-step Clearance Control is now being furnished on Type XCB belt driven compressors. With this control compressor regulation is efficiently obtained in five steps, viz., *full, three-quarter, one-half, one-quarter and no loads.* This method of regulation is entirely automatic and is controlled by the air receiver pressure.

Other Type XCB features include Ingersoll-Rand plate valves, enclosed construction and automatic lubrication.

Let us send you a copy of Bulletin 3042 which describes these units.

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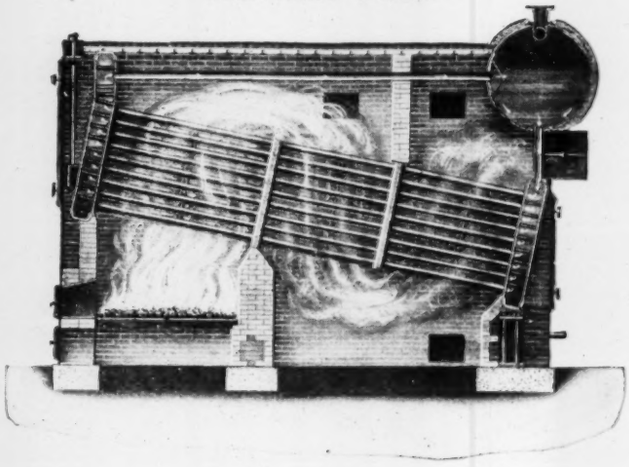

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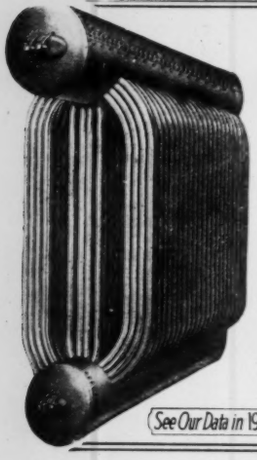

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Longitudinal Drum Type with either vertical or horizontal baffle

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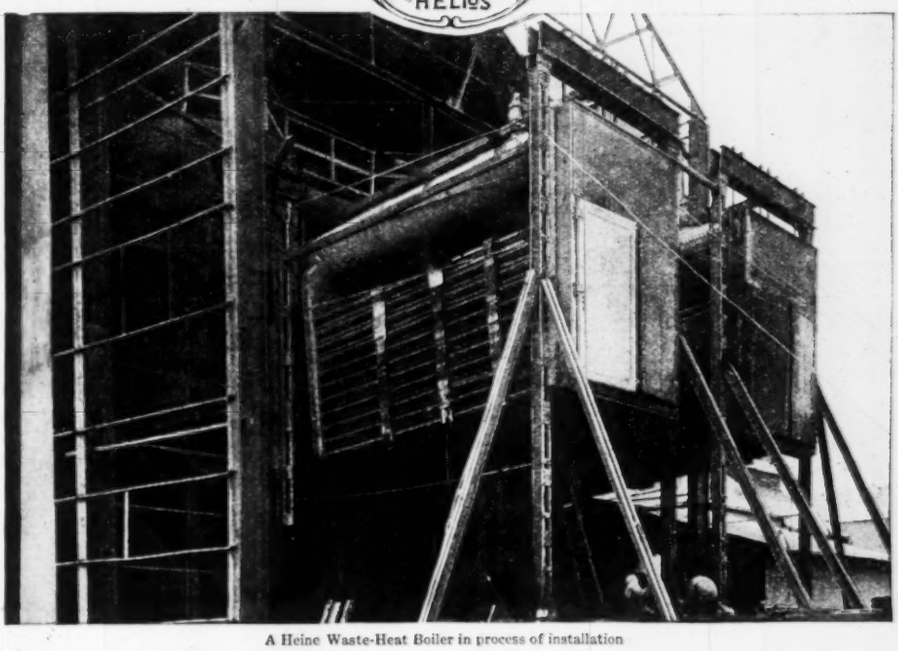

A Heine Waste-Heat Boiler in process of installation

Heine Waste-Heat Boilers

can be profitably used in such plants as employ any of the following furnaces for industrial operations:

Open-Hearth Steel Furnaces
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Wherever conditions permit the installation of Heine Waste-Heat Boilers it is possible to increase substantially the thermal efficiency of the primary furnace. In fact, the economy effected by the **utilization** of the waste heat from the primary furnace for steam generation is often sufficient to pay the cost of the installation in a few years.

Inasmuch as there are many modifying conditions affecting the proper design of boilers of this type, such as raw materials, fuel, operating characteristics of the primary furnace, etc., each installation requires individual study to determine the feasibility of the plan and the best methods of application. The Heine Boiler Company will be glad to answer in detail any inquiries of this nature.

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Also Agencies in many other cities

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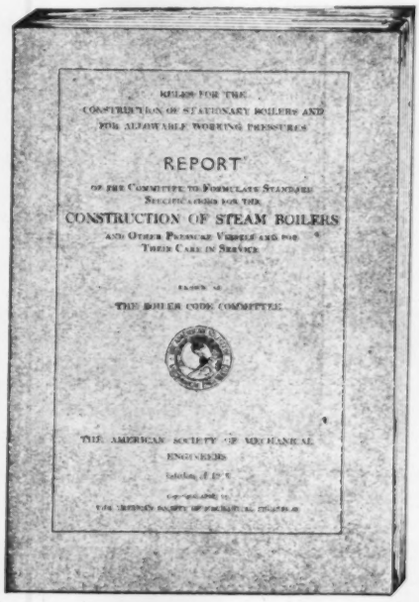
HEINE LARGE UNIT BOILERS

REVISED EDITION OF THE
A. S. M. E. Boiler Code
American Standardized Boiler Construction

THE Edition of 1918 of the A. S. M. E. Boiler Code has incorporated interpretations that had been formulated by the Boiler Code Committee concerning the rules, and in addition some explanations and amplifications of certain of the rules, together with new illustrations, to render the Code more clearly applicable to general boiler construction work, but the scope of the Code is unchanged from the edition of 1914. The construction rules are divided into two parts, one for new installations and the other for existing installations, and following this is an appendix in which are placed examples, illustrations, references, and data that are in nature supplementary.

For the engineer, designer and student, the Boiler Code is invaluable as a treatise, covering the modern details and methods of construction of steam boilers and rules for determining the allowable working pressures for boilers in operation. It is used in many of our leading universities as a text book or reference book on boilers.

The A. S. M. E. Boiler Code is now operative as a legal construction code in the states of Arkansas, California, Delaware, Indiana, Maryland, Michigan, Minnesota, Missouri, New York, New Jersey, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Utah and Wisconsin. It is also used as a standard by fifteen of the leading boiler insurance companies, leading boiler manufacturers, and by many of our foremost consulting engineers. The U. S. Government now specifies that boilers for many important Departments are to be in accordance with the Am. Soc. M. E. Boiler Code.



REVISED EDITION
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One hundred and forty-six pages, including appendix and index.
Thirty-five illustrations. 8vo.

PRICES
$.50 to members. $1.00 to non-members.

OFFICIAL BOILER STAMPS

Stamps for impressing the official symbol, as shown in Fig. 23 (page 87 of the Boiler Code, Edition of 1918), are obtainable only from The American Society of Mechanical Engineers (see Par. 332, Boiler Code). The stamps are obtainable in two forms, one, the regular hand stamp with ¾in. symbol, at $4.50 each, and the other, a special hammer-type stamp, with ½in. symbol, at $4.50 each. The hammer-type stamp is particularly serviceable for stamping thin boiler plate.

It is a requirement of the Boiler Code Committee that the boiler manufacturer in purchasing the official boiler stamp shall furnish an Affidavit on a special blank form obtainable from the headquarters office of the Society. It is expected that the order for each stamp purchased shall be accompanied by one of these Affidavits properly filled out and with the signature of the company officially acknowledged by a Notary Public. It should be explained that this requirement for the boiler stamp is solely for the purpose of safeguarding the use of the stamp in certifying that boilers are built to the requirements of the A. S. M. E. Boiler Code. It is not the intention of the Boiler Code Committee to unduly restrict the use of the stamp, but it has been the feeling that this requirement will prevent its unauthorized usage under any circumstances.

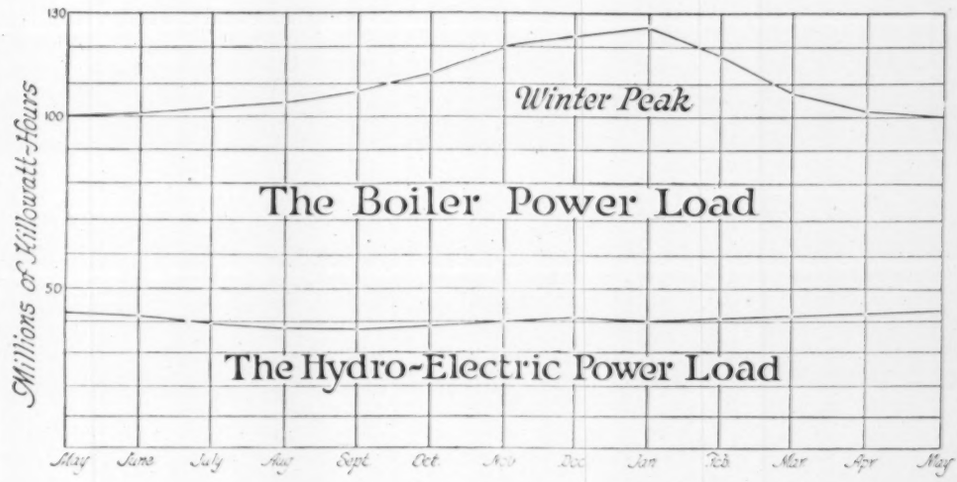
Manufacturer's Data Report Forms

Manufacturer's Data Report Forms are also offered for sale for the convenience of manufacturers who desire to enter boilers in different states where the A. S. M. E. Boiler Code is operative. These blank forms are available at the following prices:

Single Copies 5c each.

In lots of 6–24...3c each
In lots of 25–100.2c each
In lots of 100 or more
.....1½c each

The American Society of Mechanical Engineers
29 West 39th Street, New York



The Nation's Seasonable Overload is Carried by Its Boilers

Winter is the peak season for both central station and industrial power loads.

This overload of the nation must be carried by its boilers.

In the spring, when the load factor is lower, flood water lets the hydro-electric stations assume a larger share of the total burden, but the reduced stream flow in cold weather prevents their maintaining the same proportionate output.

All the excess load is thrown on the boilers at the very time when power loss, as well as power demand, is greatest. The boilers must be forced and the greatest quantity of fuel must be burned at the time when it is most difficult to get and commands a high price, and when transportation facilities are taxed by the increased traffic burden.

This unbalanced condition can be relieved — not wholly, but partially and to a degree that will effect extensive and worth while economies — by the use of water tube boilers so designed that they will respond to overload demands in the minimum of time with the maximum of economy and efficiency.

To those who are interested in finding out more about efficient water tube boilers, we shall be glad to send interesting information on this subject.

EDGE MOOR IRON COMPANY

Established 1868

EDGE MOOR — DELAWARE

New York
Pittsburgh
Boston

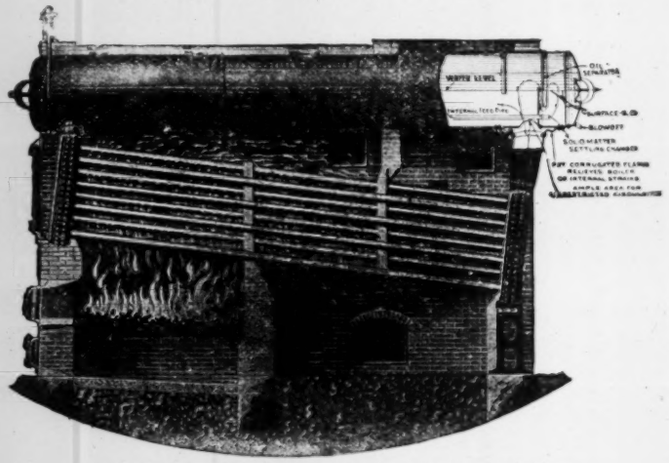
Charlotte
Chicago
St. Paul

EDGE MOOR

Water Tube BOILERS

UNION WATER TUBE BOILERS

The Boiler that Purifies Its own Feed Water



Write for our latest catalogue or ask that our nearest sales engineer call on you.

A few of the many "Union" features

Unexcelled high steaming capacity.

Dry steam at all loads.

Cross baffles to insure better heat transmission.

Straight tubes, correctly spaced to provide full access for blowing soot, either by any make of mechanical cleaners or by hand lance.

Union Water Tube Boilers are designed to produce steam efficiently and to perform economically under all operating conditions.

UNION IRON WORKS **ERIE, PA.**

A.S.M.E. CODE BOILERS

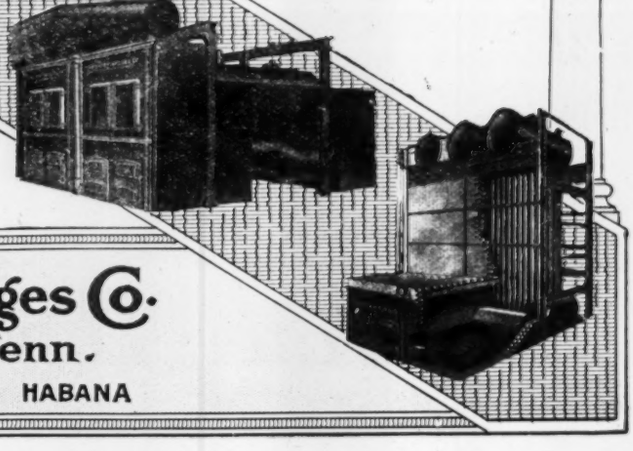
The Casey-Hedges Boilers are the result of years of experience in the design and construction of all types of boilers. They are built to conform with the standards of the A. S. M. E. Boiler Code—they are safe, economical and durable.

They are efficient and durable

All types of Casey-Hedges Boilers are designed to give the maximum of horse power with the minimum of fuel consumption.

Let our engineering department assist you in selecting your next unit.

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment



The Casey-Hedges Co.
Chattanooga, Tenn.
CHICAGO NEW YORK HABANA

FOSTER

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits.

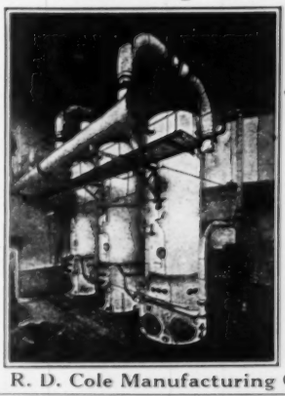
POWER SPECIALTY COMPANY

111 BROADWAY NEW YORK

Boston, Philadelphia, Pittsburgh,
Chicago, San Francisco, London, Eng.

SUPERHEATERS

Cole-Manning Vertical Fire-Tube Boilers



This type of boiler is constructed in units up to 400 horse-power and for pressure of 200 lbs. or more. Boiler shell is supported on a one-piece cast iron base which can be fitted with stationary or shaking grates. Smoke box is provided with removable cast iron cover and connections for all standard soot-cleaning devices. The evaporative performance, super-heating qualities and small floor space per horse power combine to make a most desirable and economical unit.

Further information regarding Cole Boilers, Tanks, Plate Work, etc., will be found on page 63 of the 1921 volume, A.S.M.E. Condensed Catalogues.

R. D. Cole Manufacturing Co. Newnan, Ga.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, North American Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
FORT WORTH, TEX., Flatiron Building
HONOLULU, H. T., Castle & Cooke Building

THE BABCOCK & WILCOX COMPANY — STEAM

WORKS

Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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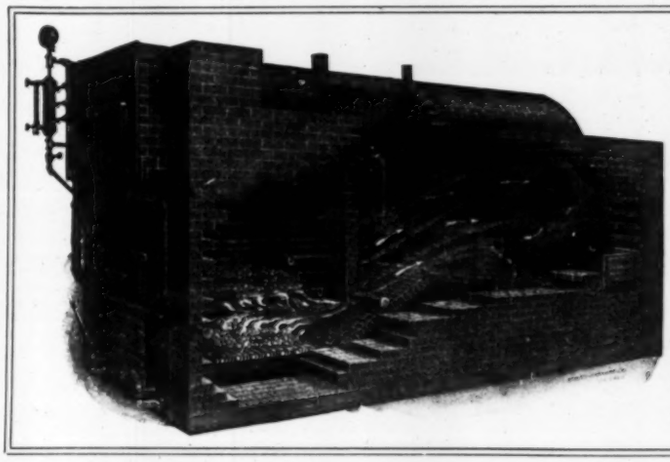
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building



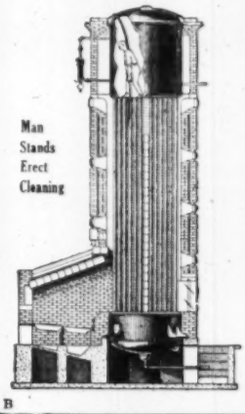
Herbert Smokeless Boilers

Down Draft **Detachable Firebox**

An absolutely smokeless boiler that is guaranteed to consume 95% of smoke from any grade of mine coal and to increase the boiler capacity from 5 to 25 h.p., depending on size.

HERBERT BOILER CO., Chicago

New York City St. Louis, Mo., Minneapolis, Minn., Atlanta, Ga.
Omaha, Neb., Milwaukee, Wis., Seattle, Wash., Denver, Colo.
Salt Lake City, Utah Oklahoma City, Okla. Wichita, Kan.
Spokane, Wash. Montreal, Canada Toronto, Canada



B

Wickes Vertical Water Tube Boiler

Ever cleaned a boiler, lamed your back, bruised your knees and skinned your elbows doing it?

Two men can open, wash, close and fill the WICKES in five hours. Turbine in ten hours.

Ask for Bulletin—Reducing Cost in the Boiler Room—sent free

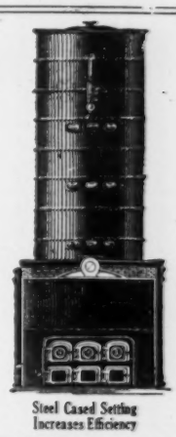
THE WICKES BOILER CO.

SAGINAW MICHIGAN, U. S. A.

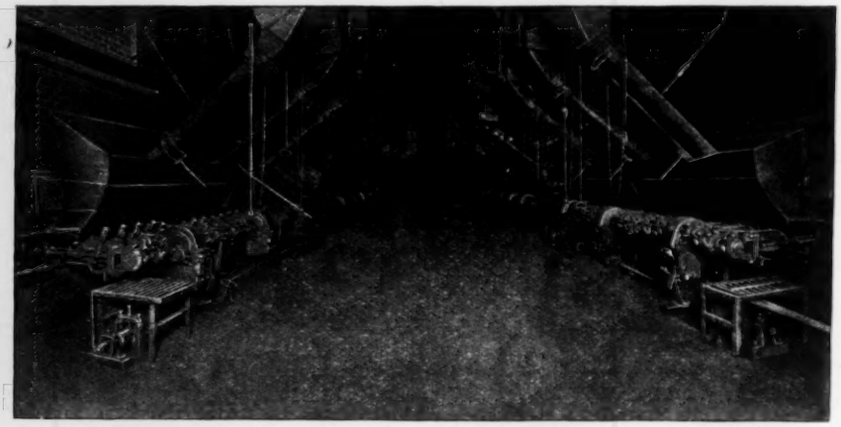
SALES OFFICES

New York City, 1716 West St. Bldg. Boston, 201 Devonshire Street
Chicago, 76 West Monroe Street Detroit, 1116 Penobscot Building
Pittsburgh, 1218 Empire Building Seattle, 736 Henry Building

See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment



Steel Cased Setting Increases Efficiency



Bigelow - Hornsby Water-Tube Boilers at Hartford Electric Light Company.

BIGELOW-HORNSBY WATER-TUBE BOILERS

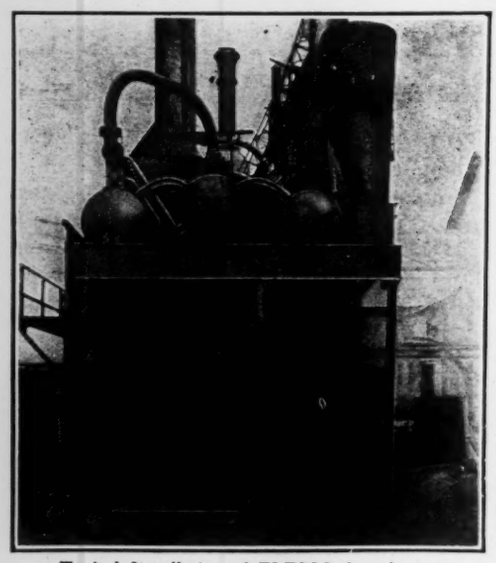
How cheaply can you generate your steam?
When boilers are purchased on this basis they become a valuable asset in the earning capacity of your plant.
Economical steaming, combined with a high factor of safety, results from the scientific design and better than code construction of Bigelow-Hornsby Water-Tube Boilers.

The contra flow of the gases in thin streams that completely surround the tubes in thin streams, together with unrestricted circulation through straight tubes, secures the maximum heat absorption and enables these efficient boilers to carry extreme overratings.

Write for new Catalog B-H-20 now.

The Bigelow Company, 68 River St., New Haven, Conn. New York Boston

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment



Typical Installation of ELESCO Superheater

MEETING THE PEAK LOAD ECONOMICALLY WITH ELESCO SUPERHEATERS

High degree superheat provides the boiler reserve necessary for emergencies. Peak loads are met economically and efficiently when boilers are superheated.

Forcing a saturated boiler is not only wasteful but costly, as it increases boiler, steam line and engine repairs.

Elesco Superheaters furnish additional boiler capacity, and reduce maintenance costs, or save from 10 to 20% of the fuel. They are easily installed without change to boiler settings.

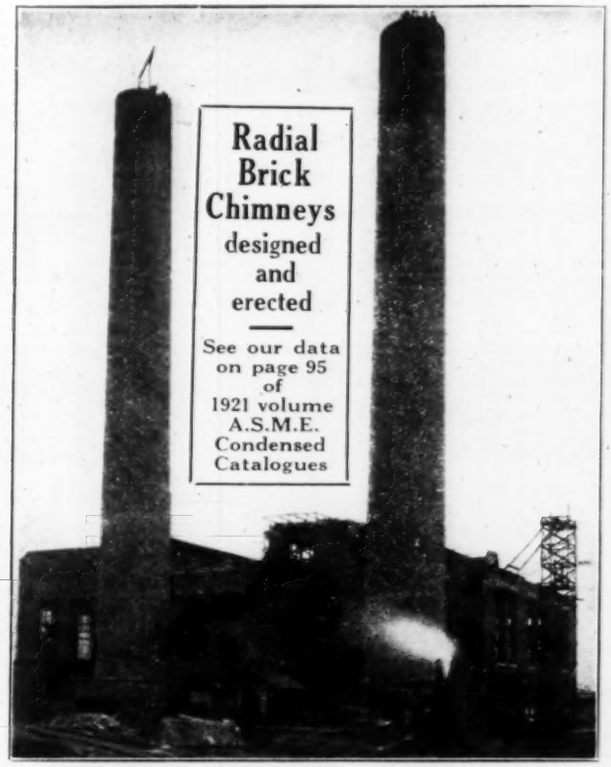
A study of your boiler capacity and peak demands by Elesco Engineers will involve no obligation on your part. Similar studies have saved thousands of dollars for other plants.

THE SUPERHEATER COMPANY

General Offices: 17 East 42nd Street, New York

CHICAGO: Peoples Gas Bldg. PITTSBURGH: Union Arcade Bldg. BOSTON: 79 Milk Street
For Canada: THE SUPERHEATER CO., Ltd., Montreal

Designing Engineers and Manufacturers of ELESCO Steam Superheaters and Pipe Coils for all purposes. Feed Water Heating Equipment for Locomotive Service. Boiler Feed Pumps for all Services.


Radial Brick Chimneys designed and erected
See our data on page 95 of 1921 volume A.S.M.E. Condensed Catalogues

AMERICAN CHIMNEY CORPORATION
147 Fourth Avenue, New York
BOSTON PHILADELPHIA CLEVELAND CHICAGO

THE HEINE CHIMNEY CO.
ENGINEERS and BUILDERS

RADIAL BRICK and CONCRETE CHIMNEYS

Chicago, Ill. 123 W. Madison St.
New York, N. Y. 30 Church St.

Branch offices in all principal cities

Federated Engineers Development Corporation
154 Ogden Ave. Jersey City, N.J.

Founded by a group of America's foremost industrial and technical experts who serve on its Advisory Council.

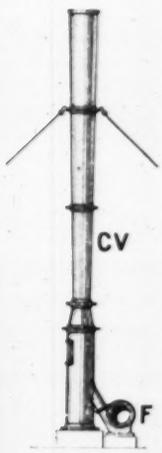
INVENTIONS

Among the thousands of unsuccessful inventions patented each year are many that possess real merit. They fail, however, because the inventor does not know how to develop and market them.

We are organized to furnish the inventor with business brains and technical talent of the highest calibre, asking in return only a fair share of the profits earned by the invention.

Pres. T. Irving Potter
Vice-Pres. Dr. Charles P. Steinmetz
Sec'y A. Russell Bond

KOERTING
Suction Draft System



induces draft at base of stake by means of Air Jet supplied from small high speed blower. Can be applied to existing stacks to increase draft.

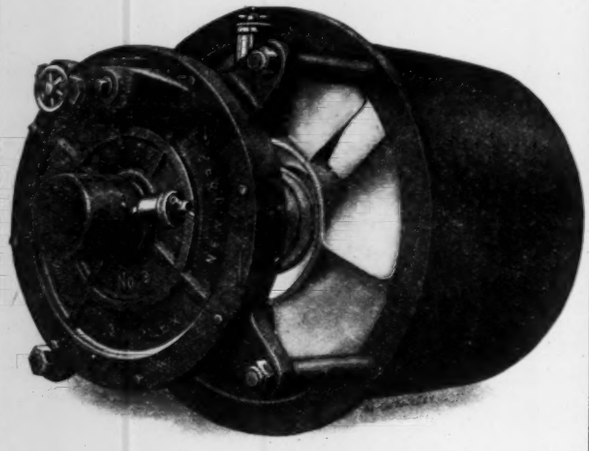
Blower or fan handles only clean cool air.

Permits use of **LOW GRADE FUEL**
Overload easily carried

Catalog 4-C

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

PHILADELPHIA · PA · 1166 THOMPSON · STR ·
SCHUTTE KOERTING



"Simplex" No. 3
TURBO-BLOWER

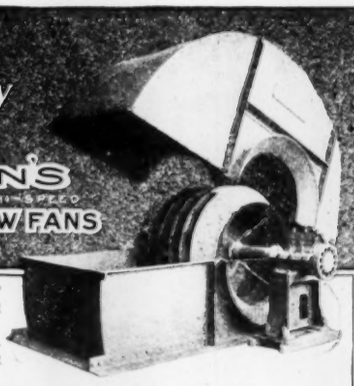
is the simplest Draft Equipment for steam boilers, where economy, efficiency and capacity is desired. In use in every part of the world.

Details on Request

POWER TURBO-BLOWER COMPANY
Borden Bldg., Madison Ave. New York City

Save Auxiliary Power

GREEN'S
HI-EFFICIENCY, HI-SPEED
RADIAL FLOW FANS



Type "RB" Forced Draft Service
Type "RR" induced Draft Service.

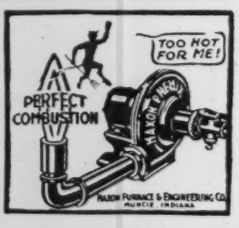
More Draft for Less Power

Green's Radial Flow Fans are built for capacities of 1600 to 275,000 Cubic Feet per minute at pressures up to 7" of water.

These Fans, besides having low horse power requirements, operate at the most economical speeds for direct connection to turbines or motors, making possible small high speed efficient units.

Our Engineers will be glad to submit data for your requirements. Write for our Bulletin No. 152. 1

THE GREEN FUEL ECONOMIZER CO.
BEACON, N.Y.



MAXON PREMIX BURNERS
BURN
GAS or OIL

They Are Complete Motor Driven.
FUEL BURNING UNITS
Supplying the Air and Fuel
INTIMATELY MIXED
So that Complete Combustion is Secured

Applicable to All Industrial Furnaces

Maxon Furnace & Engineering Co.
MUNCIE, INDIANA
NEW YORK PITTSBURGH CLEVELAND CHICAGO

See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment

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PULVERIZED COAL EQUIPMENT

FULLER-LEHIGH Pulverizers, Crushers, Dryers, Furnace Feeders, and Burners promote maximum economy in fuel utilization.

BULLETIN 600 just off the press contains the latest information on Pulverized Coal for Boilers. We will mail you a copy with pleasure.

FULLER-LEHIGH COMPANY
FULLERTON, PA., U. S. A.

See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment

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SPECIALIZED CONSULTING SERVICE

in ALL BRANCHES of the ENGINEERING FIELD

The cards of Consulting Engineers appearing on pages 86, 87, 88, 89, 90, 91 and 92 serve as an index to professional service in the mechanical field. Specialized service may be obtained through this section on such subjects as

Accounting
Appraising
Combustion
Construction
Copyrights
Cost Systems
Designing
Foundries
Heating and Ventilating
Hydraulic Work
Industrial Plants
Inspection
Machinery Designing
Management
Manufacturing Methods
Organization
Patent Law
Plant Construction
Power Plants
Power Transmission
Production
Refrigeration
Research
Special Machinery
Taxes
Testing
Tool Designing
Trade Marks
Water Purification
Water Supply

Continuous Operation

Three features that have always been sought in the automatic stoker for the big plant are

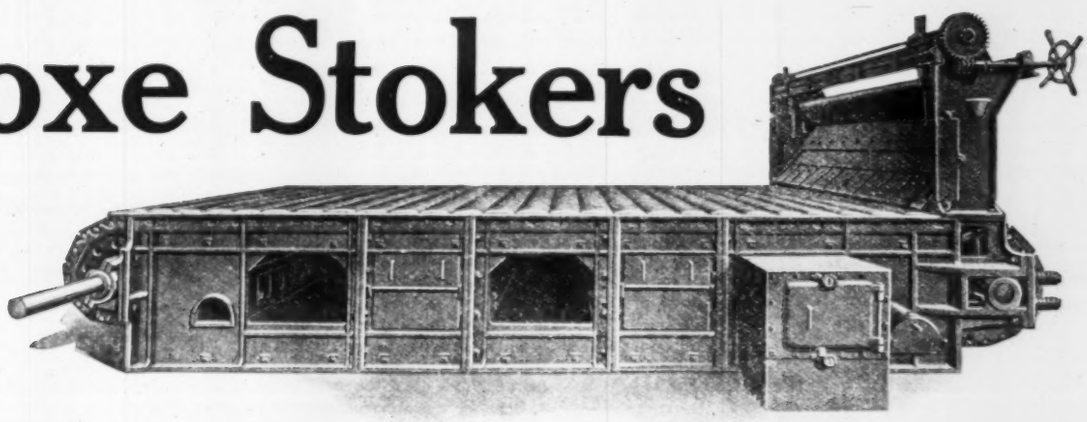
1—Uninterrupted feed of fuel

2—Uninterrupted discharge of ash without interfering with stoker operation

3—Ability to operate over a wide range of loads with any fuel either—
Bituminous or Anthracite

All of these features are prominent in

Coxe Stokers



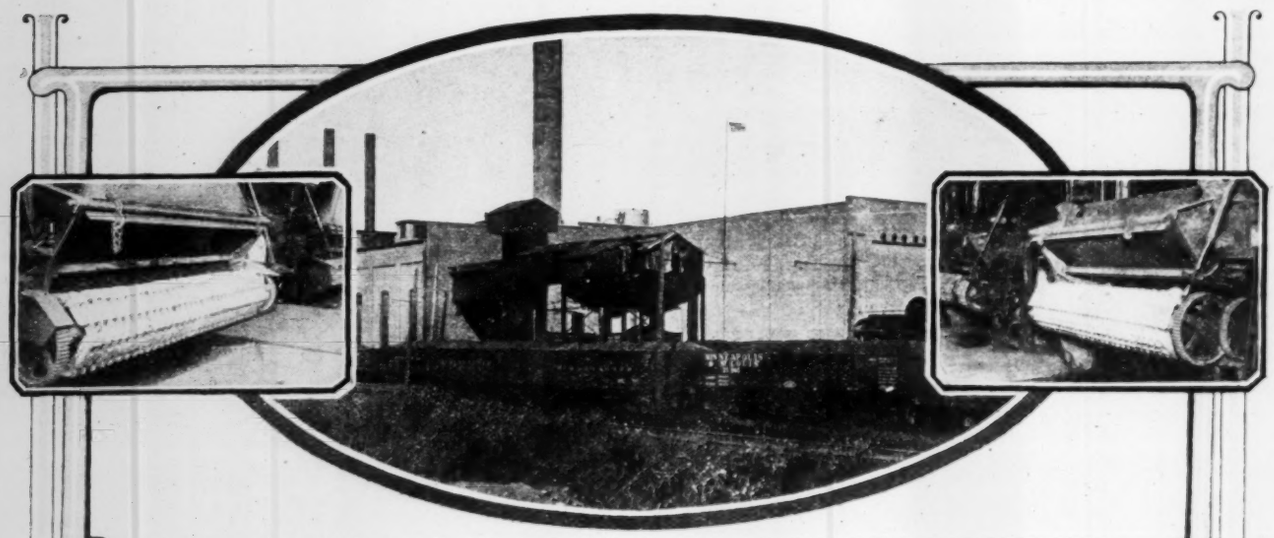
COMBUSTION ENGINEERING NEW YORK CORPORATION

Combustion Engineering Corporation

Combustion Engineering Building
Broad Street, New York City

Lopulco Pulverized Fuel Systems
Type E Stokers—for Bituminous Coal The Grieve Grate—Hand-Firing
Coxe Stokers—Anthracite Coal, Coke Breeze and Bituminous Coal

PHILADELPHIA, PA. PITTSBURGH, PA. DETROIT, MICH. MINNEAPOLIS, MINN.
BIRMINGHAM, ALA. HAZLETON, PA. BOSTON, MASS. CHICAGO, ILL.
SALT LAKE CITY, UTAH MILWAUKEE, WIS. ALBANY, N. Y.
DENVER, COLO. OMAHA, NEB. TAYLOR ENGINEERING CO., VANCOUVER, B. C.
ATLANTA, GA. CHARLOTTE, N. C.



Green Stokers Last Longer

Industrial engineers investigate three phases of the mechanical equipment which they propose to install in their factories:

Correctness of operating principle.

Materials used in construction.

Workmanship employed.

They have learned that equipment embodying the correct operating principle is limited in length of service only by the materials used and workmanship employed.

Since the patenting of the first chain grate stoker in the United States in 1848 the operating principle of burning coal progressively with continuous ash discharge has never changed.

Materials used and workmanship employed in Green Chain Grate Stokers insure longest service. They set the standard for the boiler room—your steam factory.

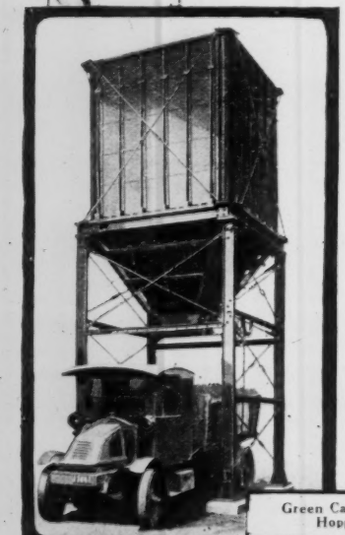
Hundreds of Green Chain Grate Stokers that have been in use from fifteen to twenty years have been modernized and are delivering results comparable with new installations.

Write to Department M for information on how Green Chain Grate Stokers meet every factory standard.

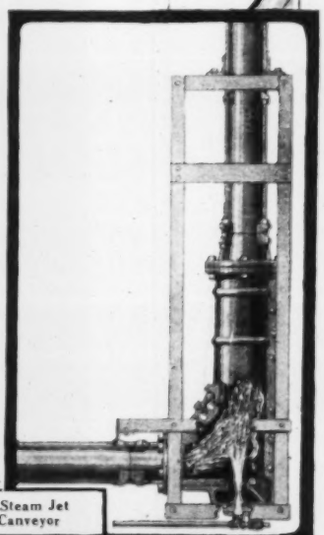
Green Engineering Company

70 Kennedy Avenue

East Chicago, - - Indiana



Green Cast-Iron Hopper



Green Steam Jet Ash Canveyor

Green Chain Grates

Chain Grate Stokers
Ash Conveyors
Cast-Iron Hopper
Sealflex Arches
Pressure Waterback

Roach Stokers

Buyers of Stokers

are primarily interested in—

COMBUSTION EFFICIENCY

and

LOW-MAINTENANCE COSTS

THE ROACH STOKER FULFILLS THESE REQUIREMENTS

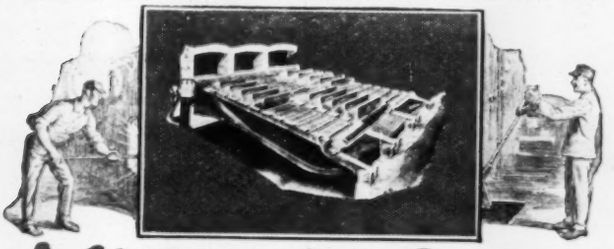
"STANDARD" MODEL for boilers of 750 horsepower maximum

"SIMPLEX" MODEL for boilers of 250 horsepower maximum

Roach Stoker Company

Presser Building
Philadelphia, Pa.
Distributors in Principal Cities

STOKERS THAT STOKE



A lighter job for him

The fatigued fireman wielding a sluggish slice bar through an open fire door is frequently tempted to "skimp" his job. Lowered morale and diminished efficiency are natural with the unbearable conditions produced by the ordinary flat grate system of firing. These very conditions are as unprofitable to you as they are harmful to the fireman.

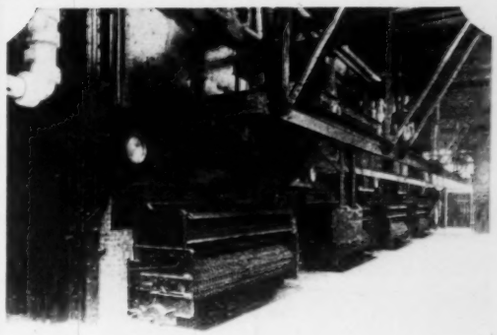
Expert as he may be, hard as he may work, he cannot produce the clean, level fire necessary to maximum combustion efficiency. And the open fire doors only serve to destroy the draft.

In comparison—the Files Hand Stoker easily produces a rich, uniform fire bed behind closed fire doors. The fireman's job is made lighter—your profits are made heavier; his results are ideal; steam costs are considerably reduced.

Much useful data, showing how the Files Stoker eliminates the evils of the open fire door, is contained in Bulletin H. Write for a copy.

THE FILES ENGINEERING COMPANY, INC.
PROVIDENCE RHODE ISLAND
Branches in Principal Cities.
Canadian Mfrs.: Waterous-Brantford, Ont.

Files Stokers
Hand Operated



Is fuel waste the price of overload capacity?

IN many plants ability to meet and sustain overratings is obtained only by sacrificing efficiency during the off-peak periods. For in the ordinary stoker installation proper grate area is provided to meet the steam demand when the stoker is operated at the maximum combustion rate. But when the draft is reduced to seventy five or fifty per cent of rating the efficiency drops.

Contrast this to the Illinois method of securing highest efficiency at all loads. The grate area is divided into zones. Each zone is individually controlled and may be supplied with just the right amount of air to utilize every heat unit of the fuel on that section of the grate. Thus for operation at reduced loads, the last sections are dampered off to meet the reduced load, and the sections near the fuel gate burn as briskly and efficiently as when operated at maximum capacity.

Highest efficiency at high, intermediate, and low loads is obtained with Illinois dampered air control in both types of Illinois Chain Grate Stokers—Type A Natural Draft and Type G Forced Draft with mechanical ignition for burning high-moisture, low volatile coals.

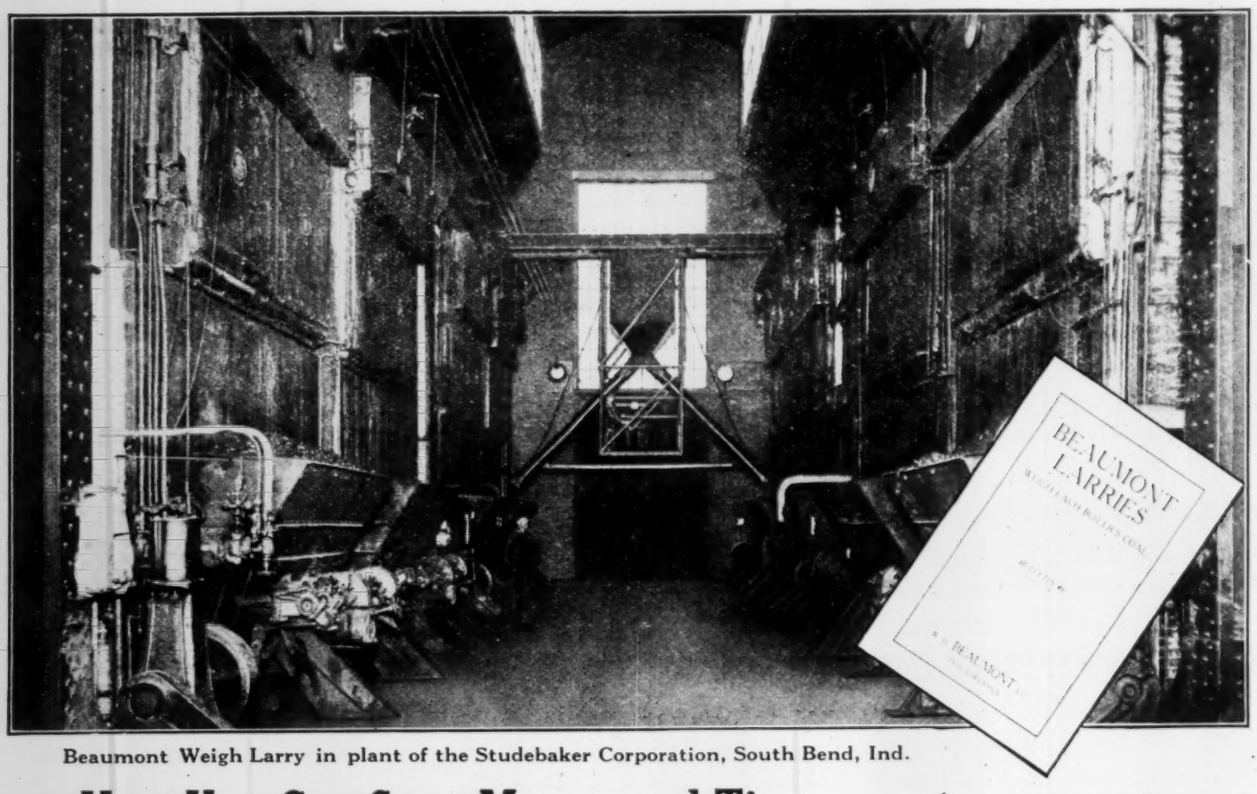
Illinois Stoker Co.

102 West 7th Street

Alton, Illinois

Chicago—Ernest E. Lee Co., 115 S. Dearborn Street
Kansas City—J. F. Pritchard & Co., 419 Reliance Bldg.
Louisville—W. R. Wood, 601 Lincoln Bldg.

ILLINOIS
CHAIN GRATE
STOKERS
With Dampered AIR CONTROL



Beaumont Weigh Larry in plant of the Studebaker Corporation, South Bend, Ind.

How You Can Save Money and Time Handling Coal in Your Boiler House

is fully explained in the Beaumont booklet No. B-46

How you can dispense with expensive hopper bottom bunkers and chutes;

How you can easily weigh and record the amount of coal delivered to each boiler;

How you can have an effective fire-fighting apparatus at no extra cost;

How you can keep your firing aisles clear of all obstructions, thus facilitating boiler cleaning and tube replacements;

These and many other advantages of handling coal in the boiler house with the Beaumont Weigh Larry (for plants of 1500 H. P. and greater) are explained in detail in booklet B-46.

A copy is here for you; your request starts it on the way.

Beaumont
ONE CONTRACT ONE RESPONSIBILITY

A Few Plants Using Beaumont Equipment

H. W. Johns-Manville Company
Manville, N. J.

Studebaker Corporation
South Bend, Ind.

Alfred Wolstenholme & Sons
Philadelphia, Pa.

Erie Forge Company
Erie, Pa.

Fitchburg Paper Co.
Fitchburg, Mass.

P. Lorillard & Co.
Middletown, Ohio

Standard Oil Co.
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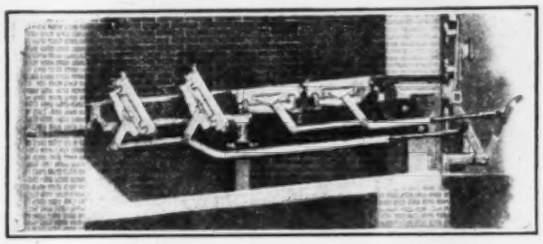

DEAN DUMPING GRATES

The most important detail of construction in the Dean Dumping Grate is the method of supporting the bar at the ends by means of the cradle. This construction eliminates the large slot in the centre, which is objectionable, as it weakens the casting and allows it to warp downward on the ends and also to bind on the shaft which supports it.

Particular attention is called to the design of the ends of the bars, which overlap. This construction prevents loss of coal between the bars and also provides for ample expansion, as the bars lengthen with continued use.

The carriers are made in one piece so as to eliminate all loose pieces, bolted caps or open slots, at the same time retaining over 60% of the cross section of the carriers over the journal opening.

More details of construction in catalogue No. 7 M E

BUILT UP TO A STANDARD—NOT DOWN TO A PRICE

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for all types of Water Tube Boilers

No part of apparatus exposed to heat of furnace except when in actual operation.

Adiabatic nozzles give tremendous velocity to the steam and remove the Soot from tubes in the widest Boiler.

The nozzles follow the inclination of the tubes and the steam does not directly impinge on any tube at any time, thereby eliminating all danger of erosion.

Write for Bulletin A.

MONARCH REAR END FLUE BLOWER

for Fire Tube Boilers

Sets in the rear wall and blows with the draft, not against it.

Extremely low cost of maintenance.

Write for Bulletin B.

MONARCH SOOT REMOVER CO., INC.

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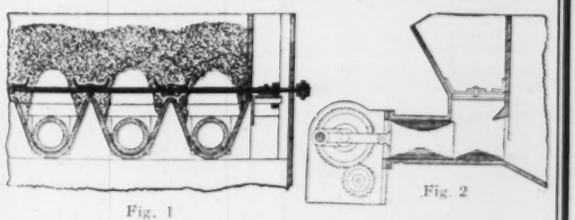


Fig. 1 Fig. 2

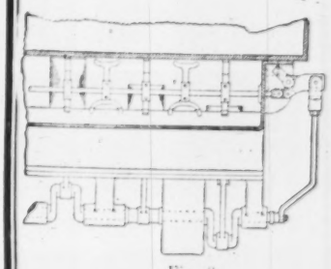


Fig. 3

Fig. 1 Front Elevation

Fig. 2 End Elevation

Fig. 3 Plan View

DO YOUR STOKERS RAM THE AIR?

When wet coal forms arches over the rams of your stokers, what happens?

Either the arches must be dislodged promptly by hand or your stoker rams feed no coal to the furnace. That means reduced boiler capacity, and possible damage to stoker parts.

NEGUS-TIFFANY COAL AGITATORS

afford a sure and economical remedy for such troubles.

The "U" shaped agitator arms attached to the horizontally reciprocated Rod in the bottom of the hopper (see Figures 1 and 3) cut away the bases of the arches in the coal that rest on the hopper bridges. Relieved of the supporting bases, the coal arches are undermined—cave in—and fall down into the space in front of the stoker ram, at the moment of its return forward movement. The agitator works in unison with the stoker through suitable connections with the main stoker crank-shaft.

Increases stoker capacity and boiler efficiency.

Saves labor, and breakage of stoker parts.

May be attached to all types of Multiple Retort Underfeed Stokers.

The Sanford Riley Stoker Company of Worcester, Mass., is licensed under the Negus-Tiffany patents to make and sell these agitators for use on NEW Riley Stoker installations.

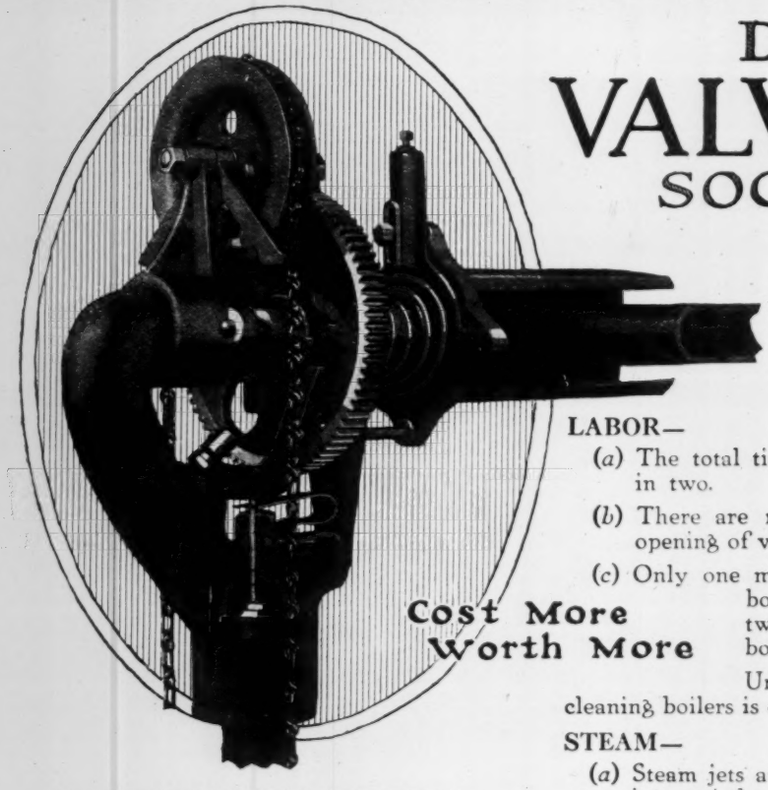
Details promptly on request.

W. E. ELLIS COMPANY

HAVERHILL, MASS.

also See page 132, 1921 volume of A.S.M.E. Condensed Catalogues.

40 to 50% Saving on Labor and Steam



DIAMOND VALV-IN-HEAD SOOT BLOWERS

Cost More Worth More

COST of labor and steam are two important items in soot blower operation. Note how the Diamond Valv-in-Head cuts these costs in half:

LABOR—

(*a*) The total time required for blowing is cut squarely in two.

(*b*) There are no lost steps and no lost time between opening of valve and operation of unit.

(*c*) Only one man is required, no matter how large the boiler. (With other types of blower heads two men are customarily employed on large boilers).

Under these conditions the cost of labor for cleaning boilers is comparatively small.

STEAM—

(*a*) Steam jets are revolving throughout the entire blowing period.

(*b*) Speed of rotation is controlled by gear reduction. No waste of steam occurs as the result of too slow or too rapid operation.

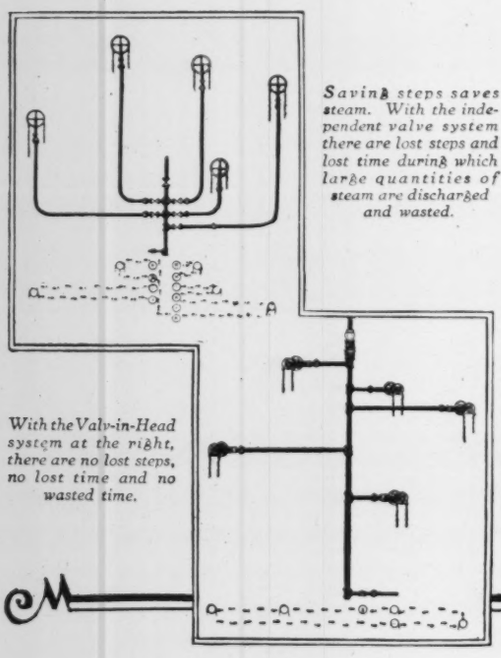
(*c*) Globe valves, essential to other heads, require many valuable moments to open and close, during which steam is wasted. The automatic operation of the Valv-in-Head eliminates losses.

The saving in steam with the Valv-in-Head is pronounced, because every bit of steam does effective work in cleaning the boiler.

These are only two of eleven important advantages of Diamond Valv-in-Head soot blowers. Others include savings in pipe, valves and fittings, maintenance, gain in cleaning efficiency, etc., etc.

Every boiler needs a mechanical soot blower and you will save money by buying the best. Ask for your copy of Bulletin 237 describing the new blower.

Important mechanical features of the Diamond Valv-in-Head soot blower are: Monel metal valve seat and disc; full floating construction permitting movement of the unit in any direction; control of speed through reduction gearing; ease of operation due to ball thrust bearings, etc., etc.



Saving steps saves steam. With the independent valve system there are lost steps and lost time during which large quantities of steam are discharged and wasted.

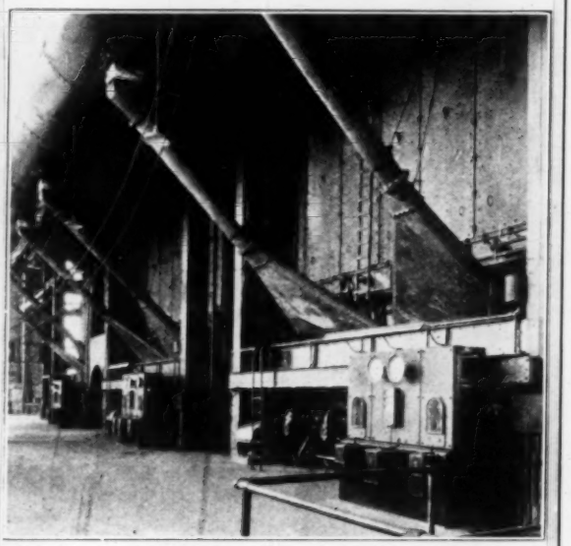
With the Valv-in-Head system at the right, there are no lost steps, no lost time and no wasted time.

DIAMOND POWER SPECIALTY COMPANY
Detroit, Michigan

Diamond

SOOT BLOWERS - SAVE 4 to 8% FUEL

Making Juice At The Mine Mouth



Seward Power Station
Penn Public Service

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Every item has been chosen with this end in view.

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These stokers are equipped with Taylor Clinker Grinders. An increasing number of plants installing Taylor Stokers specify either the Taylor Clinker Grinder or Taylor Power Dumps. These two features do away for good and all with brawn in the boiler room.

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are contained in two booklets just published and waiting your request. State whether you are interested in central station or industrial plant service.

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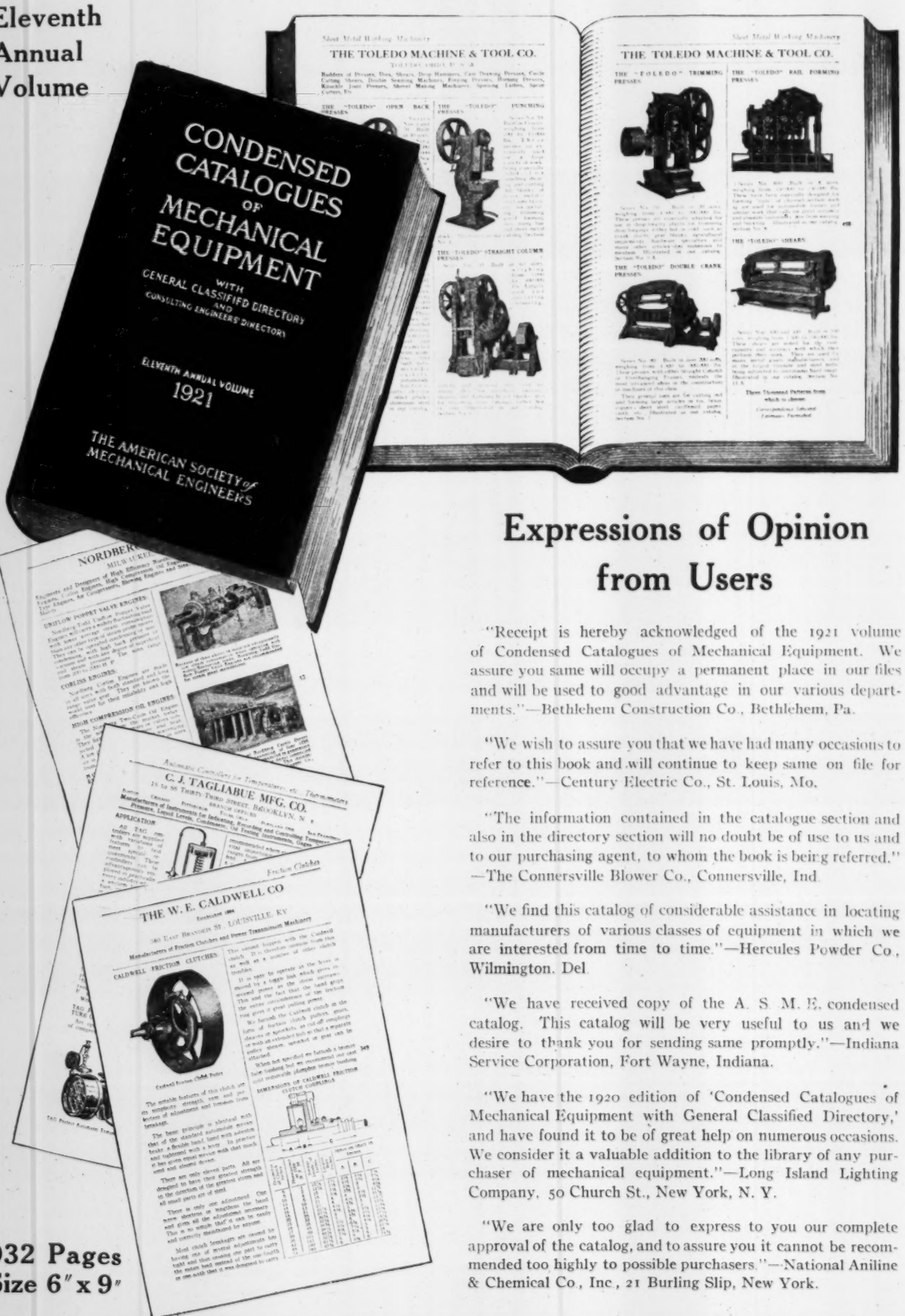
Eleventh Annual Volume



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WORKING DATA

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EVERY member of The American Society of Mechanical Engineers (prior to October 1, 1921) should by this time have received, free of charge and postpaid, one copy of the 1921 volume of Condensed Catalogues of Mechanical Equipment. New members desiring to purchase copies, and old members desiring additional copies, are entitled to a special price of $3.00, plus 25 cents for carrying charges.

A limited number of copies are available, also, for sale to non-members at $4.00 per volume (plus 25 cents for carrying charges); and all such orders will be filled as received so long as the supply lasts.

Engineers, draftsmen, purchasing agents, and all others who are concerned with the design, selection, or buying of mechanical equipment will find in this volume a considerable fund of useful working data, arranged under four principal heads as follows:

(1) 648 pages of Condensed Catalogue data covering the products of 495 leading American manufacturers; all conveniently arranged in standardized form; liberally illustrated; and containing so far as circumstances permit complete tables of dimensions, capacities, weights, etc.

(2) A 233-page Mechanical Equipment Directory or "Buyers' Guide" in which the principal products of 4,000 manufacturers are classified under 3,000 headings, with page reference in all cases where the firms listed have published condensed catalogue data.

(3) A Classified Table of Contents, which enables its user to turn at once to that section of the book in which is contained catalogue data on the desired subject.

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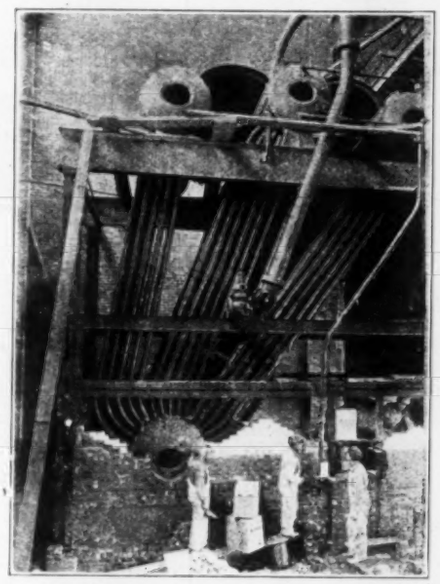

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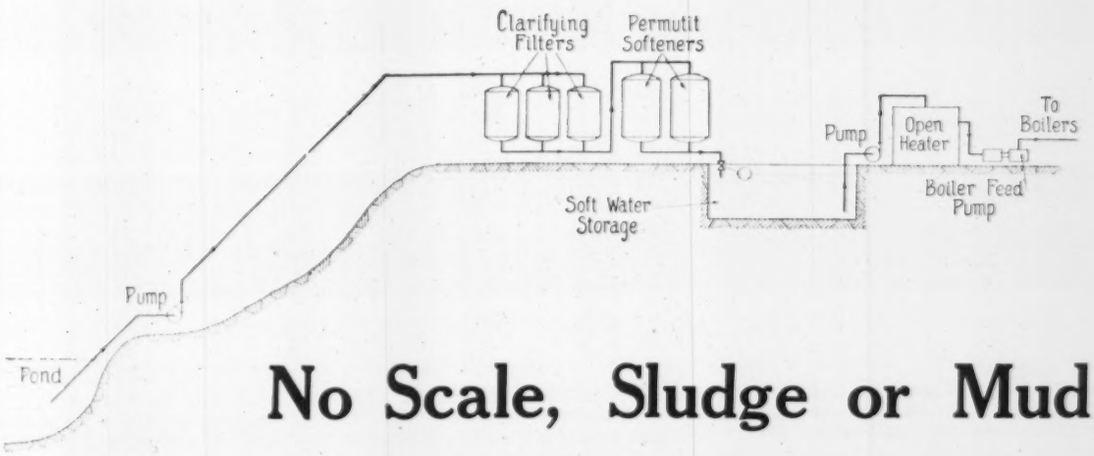


No Scale, Sludge or Mud in 5000 B.H.P. Plant

The power plant of a large manufacturer in New Jersey consists of 22 boilers developing a total of 5000 H P normal rating. It includes both fire tube and water tube horizontal boilers that operate 24 hours per day under 125 lbs. steam pressure and normal rating.

The water supply for boiler feed purposes is derived from a pond. It contains an average of 10 grains of hardness per gallon, and considerable suspended matter.

For many years this plant was put to a great expense by the continuous formation of scale, sludge and mud in the boilers. In spite of blowing off five times daily, scale deposited from 1/8" to 2" deep on tubes and heads, necessitating each boiler being cleaned and turbined every four weeks. The costs for repairs and labor were very high.

In 1919, after a very searching examination of every water softening system on the market, they installed Permutit Zeolite Water Softening Apparatus, that delivers 201,600 gallons of zero soft water in 24 hours.

All boilers and auxiliary apparatus are now absolutely clean and free from scale. A saving of 25% of boiler plant labor has been effected, the cost of repair parts and replacements has been considerably reduced, and much fuel has been saved. A recent report from the General Superintendent stated: "We have had no difficulty due to the necessity of shutting down boilers on account of scale troubles. The boilers which were clean at the time your plant was put into operation have remained clean during this period, which is something in excess of a year and a half."

Permutit Equipment can solve your problems as it has solved thousands of others. All analyses and investigations are free of charge. Let us send you our booklet, "Reducing Fuel and Boiler Plant Operating Costs."

This booklet contains valuable information that every steam boiler operator should have. It has enabled many plants to save thousands of dollars. Sent free, postpaid, upon request.

The Permutit Company
440 Fourth Ave. New York

Zeolite Water Softener Patent Sustained

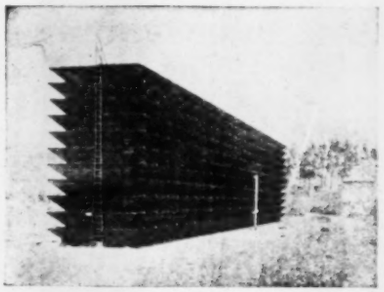
The Federal Court at Buffalo (Hazel J.) on June 15, 1921, handed down a decision sustaining our broad patent covering Zeolite Water Softeners. According to this decision all Zeolite Water Softeners on the market not made by us are an infringement of this patent.

No need to borrow trouble—buy Permutit—it is the best anyway.

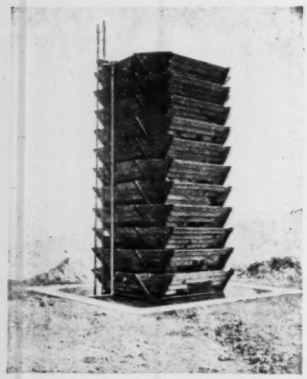
See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

BRAUN COOLING TOWERS

Constructed entirely of noncorrosive materials, the frame, decks and louvres being of California redwood which is practically immune from decay. All bolts, clips and fastenings are of brass.



Unit panel construction permits immediate shipment from stock and rapid assembling in field with common labor.



Built in capacities from
5 G.P.M. to 80,000 G.P.M.

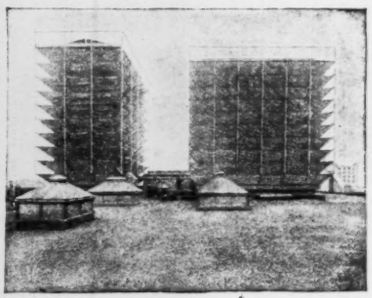
Large stock of fabricated parts ready for immediate shipment.

C. F. BRAUN & CO.

SAN FRANCISCO, U. S. A.

BULLETIN 101 SENT ON REQUEST

ECONOMY AND EFFICIENCY



EFFICIENT PRODUCTION
MEANS
ELIMINATION OF WASTE

Billions of gallons of condensing water per year which were formerly wasted to the sewer are today saved and recooled by means of

WATER COOLING APPARATUS

which allows the water to be used over and over again with only a small fractional loss.

OUR COOLING TOWERS

represent the utmost in cooling efficiency and economy of operation, and are built on the multiple unit system allowing for extension as the plant grows, thus doing away with obsolescence.

OUR IMPACT NOZZLE

excels in cooling and minimizes plugging.

THE COOLING TOWER CO., INC.
17 John St., New York
COOLING TOWERS AIR WASHERS
SPRAY NOZZLE SYSTEMS
Write for Catalogue 9B

1

1044 SPRACO Cooling Pond Systems, with a total capacity of *2,403,843 gallons per minute*, are now in successful operation in 44 states and 20 foreign countries. If you wish highest efficiency and best vacuum you should install a SPRACO system.

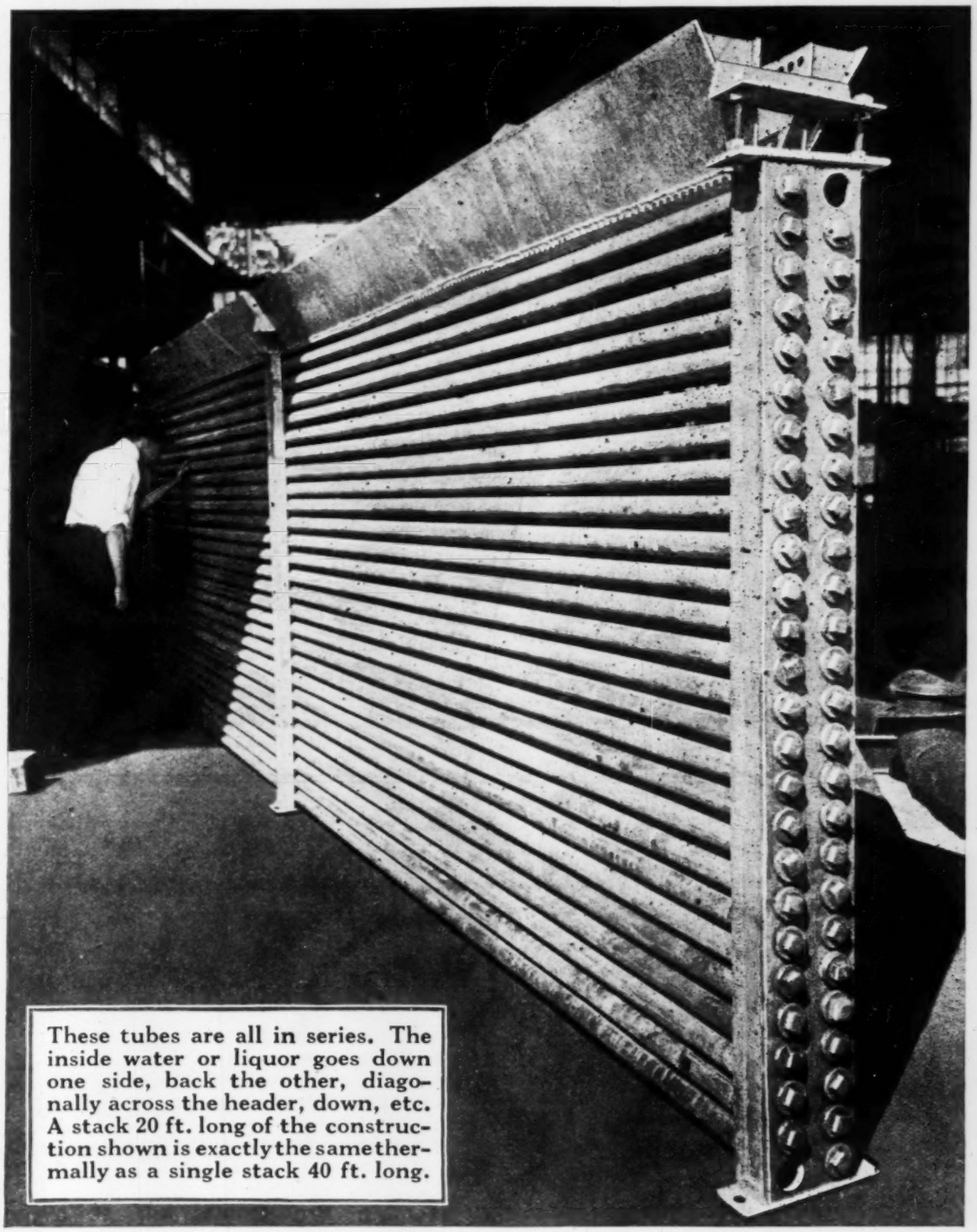
Send for Bulletin No. C-22
See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

Highest in Efficiency

Lowest in pumping head and maintenance are characteristic of all

Burhorn Cooling Towers

EDWIN BURHORN CO.
25 West Broadway, New York City
1101 Security Bldg. Chicago, Ill.



Correctly Designed Cooling Coils and Heat Interchangers

Completely zinc coated or black. The first cost installed is less.
A further saving is made every day the coils are in operation.

Are You on Our Mailing List? Send for Pamphlet No. 219 "The Last Word in Cooling Coils"

MANUFACTURING DEPARTMENT

STEERE ENGINEERING COMPANY

GAS ENGINEERS AND BUILDERS

DETROIT, U. S. A.

SPECIALIZED CONSULTING SERVICE

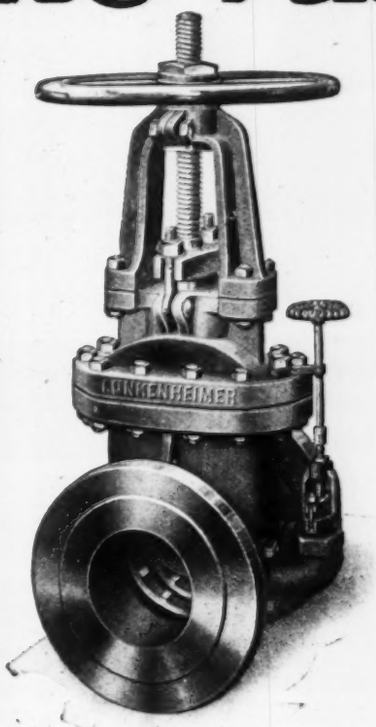
in ALL BRANCHES of the ENGINEERING FIELD

The cards of Consulting Engineers appearing on pages 86, 87, 88, 89, 90, 91 and 92 of this issue serve as an index to professional service in the mechanical field. Specialized service may be obtained through this section on such subjects as

Accounting	Gas Plants	Marine	Production	Textile Machinery
Appraising	Heating and Ventilating	Material Handling	Purchasing	Textile Mills
Building Equipment	Hydraulic Work	Oil Refineries	Refrigeration	Time Study
Combustion	Industrial Plants	Organization	Research	Tool Designing
Construction	Inspection	Paper & Pulp Mills	Silk Mills	Trade Marks
Copyrights	Invention Development	Patent Law	Special Machinery	Valuation
Cost Systems	Investigations	Petroleum	Statistics	Vibration
Designing	Machinery Designing	Plant Construction	Sugar	Water Purification
Foundries	Management	Power Plants	Taxes	Water Supply
Furnaces	Manufacturing Methods	Power Transmission	Testing	Work Routing

LUNKENHEIMER

"Victor" Gate Valves



Dependable performance is the service record of LUNKENHEIMER "VICTOR" Gate Valves. The "VICTOR" solid wedge disc, double-faced and guided in its travel, is the most practical design of Gate Valve construction. It eliminates "dragging" across the seatring faces and the consequent wear prevalent in valves employing loose parts.

Highest quality materials, coupled with the LUNKENHEIMER method of manufacture; bearings bronze bushed to minimize wear; the indestructible gasket between the bonnet and body flanges and all parts, including the seatrings renewable, all tend to enhance their value and insure longevity.

Made of Iron, bronze mounted, in both Inside Screw Stationary Stem and Outside Screw Rising Stem types, in four weights for pressures ranging from 100 to 250 pounds. Also in Quick-opening Sliding Stem type for pressures from 125 to 50 Pounds, depending on the size.

"VICTOR" Gate Valves are also made in Bronze for pressures up to 250 pounds, and in Cast Steel for pressures up to 350 pounds and temperatures to 800 deg. F.

Specify LUNKENHEIMER "VICTOR" GATE VALVES and insist on their installation.

Distributors of LUNKENHEIMER Products situated in every commercial center.

THE LUNKENHEIMER CO.

"QUALITY"

LARGEST MANUFACTURERS OF
HIGH GRADE ENGINEERING SPECIALTIES
IN THE WORLD

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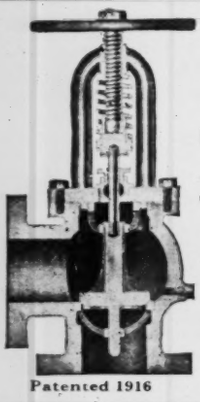
NOTE LUNKENHEIMER REPRESENTATION A S M E CATALOG

6-24-4



Patented 1916

FORD PROTECTION —No. 5

You can have full protection for your boiler plant and even make your "lazy boiler" work with FORD Automatic Stop & Check Valves.

Note the adjustable light auxiliary spring with which it is possible to secure flow of steam from boiler into the main at variable differences of pressure.

The FORD Valve is the *only* valve on the market having this feature.

Catalog No. 20 describes our full line of Valve Specialties.

FORD REGULATOR CORPN.

SINCE 1892

406 BROOME ST. NEW YORK CITY

1420 FISHER BLDG. CHICAGO, Ill.

W. P. MACKENZIE COMPANY
1500 Pennsylvania Bldg.
PHILADELPHIA, PA.

KENNEDY VALVES

have stood the test of time. Their superior features have been proven by efficient service from year to year There is no necessity for experimenting when buying valves.

Send for the Kennedy Catalogue and keep it on your desk

KENNEDY VALVE MFG. CO.

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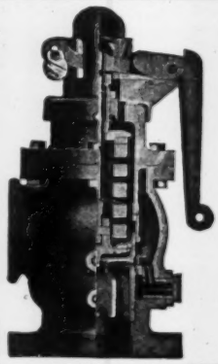
Export Office:
95 John St., New York, N. Y

New York Boston Chicago San Francisco 154



Specify Ashton Pop Valves and Gages.

A QUALITY PRODUCT with a record of over 50 years of dependable service on high-pressure power plant installations.

The Ashton Valve Co.

BOSTON NEW YORK CHICAGO SAN FRANCISCO

See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment

TRADE-MARK

Crosby CROSBY Standard

Steam Appliances

In Principle and Practice

None So Good

They are recommended and used by Eminent Engineers, Technical Schools, United States Government, and many Foreign States and Large Business Generally.

For Our Product is Manufactured on Scientific Principles

OUR NAME AND TRADEMARK IS BEHIND EVERYTHING WE MAKE

Correspondence Solicited

Crosby Steam Gage & Valve Co.

BOSTON NEW YORK CHICAGO LONDON

See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment

"A Valve in the Line is worth Two Under Repair"

Unless a valve is positively dependable and will remain tight for long periods without attention it represents a poor investment.

Pratt & Cady Renewable Valves are a worthwhile economy in times where every effort is made to reduce the cost of doing business. When after long hard service or because of scale, or other similar substances in the line, leaks develop, the worn parts can be repaired without removing the valves from the line and in minimum time.

Gate valve wedges are reversible and the discs of globe, angle and check valves, as well as seat rings in all types of valves, are renewable. No tool more complicated than a spanner wrench is needed to make the replacement.

Pratt & Cady Valves are economical in both first and final cost. You cannot afford to install any other kind.

PRATT & CADY

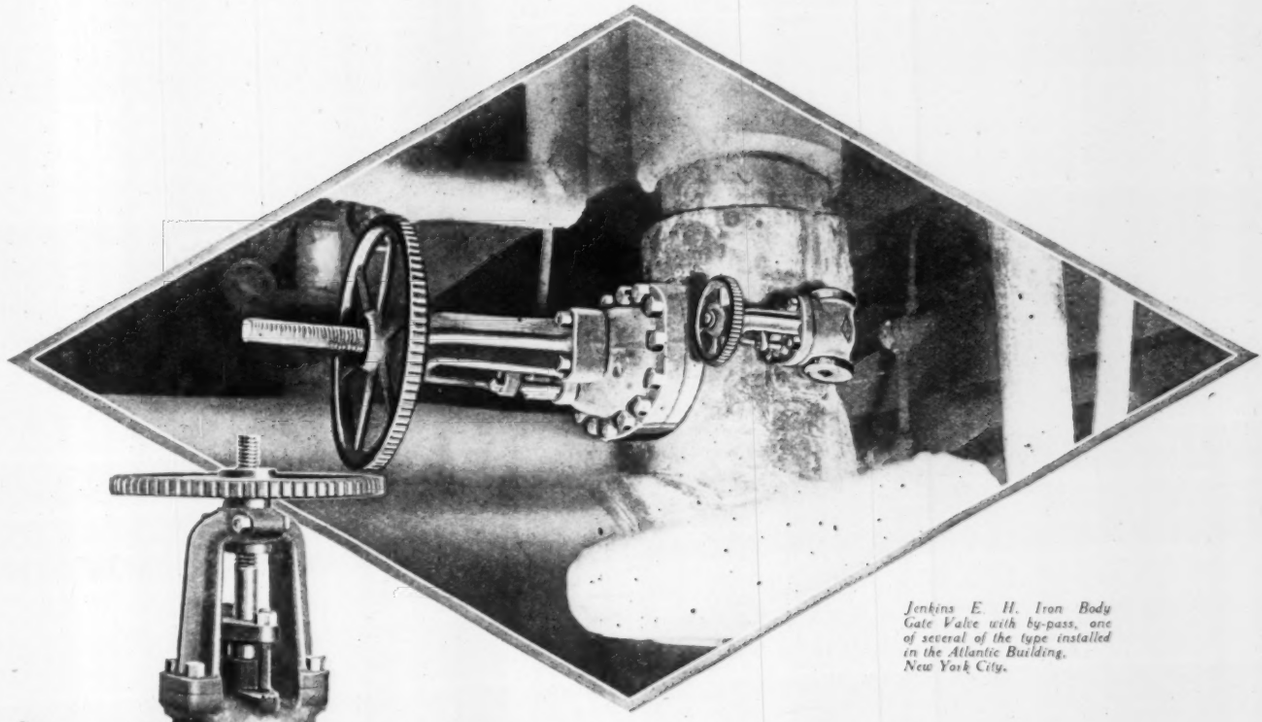
GATE-GLOBE & SWING CHECK VALVES

PRATT & CADY CO., Inc.

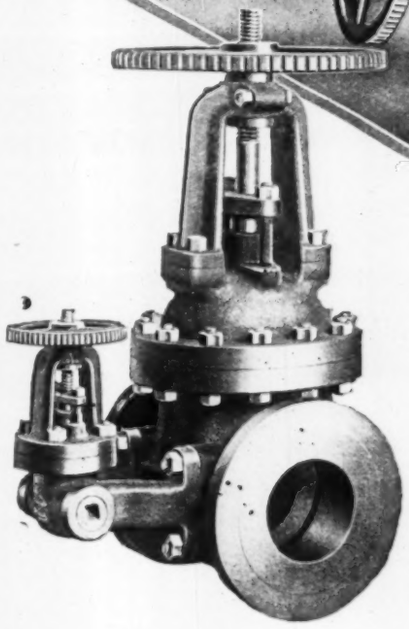
Manufacturers of Valves and Asbestos Packed Cocks that give long and satisfactory service.

Boston Cleveland Houston Philadelphia Pittsburgh Charlotte Detroit St. Paul Chicago Hartford New York San Francisco

P&C Co.



Jenkins E. H. Iron Body Gate Valve with by-pass, one of several of the type installed in the Atlantic Building, New York City.



Flanged, 204-B

Jenkins Extra Heavy Iron Body Gate Valves

Built throughout for heavy pressures and high temperatures and especially adapted to meet the requirements of modern high pressure power plants.

The valves are of the double face, solid wedge type and are made either with inside screw, stationary spindle, or outside screw, rising spindle.

Shape and the distribution of metal are such as to not only insure castings entirely free from internal and shrinkage strains, but also to secure perfect rigidity and resistance to the severe stresses incident to the service for which they are recommended.

Suitable for working pressures of 250 pounds steam or 400 pounds water. Made with screwed or flanged ends, and with or without by-pass, as ordered.

Genuine Jenkins Valves are known by the name and Jenkins "Diamond Mark"—and are obtainable through supply houses everywhere.

REG. U.S. PAT. OFF. TRADE JENKINS MARK Jenkins Bros

JENKINS BROS.

New York Boston Philadelphia Chicago
Montreal London Havana

FACTORIES: Bridgeport, Conn.; Elizabeth, N. J.; Montreal, Canada

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Jenkins Valves

SINCE 1864

From a ¼" Pigmy to

Bronze Gate Valve With Lever

Quick acting, for scale tank work. Sizes ¼ inch to 2½ inch.

Lasting

A Complete

Sizes for

of the Oil

Valves that

Chapman Valves are built with just one idea in view —to do a certain class of work *perfectly*.

Fifty years' experience in building nothing but valves has developed a complete knowledge of the requirements of each individual valve installation in the industrial world.

Based on this definite knowledge, the valve is built with full assurance that it will give unqualified service.

BRANCHES:

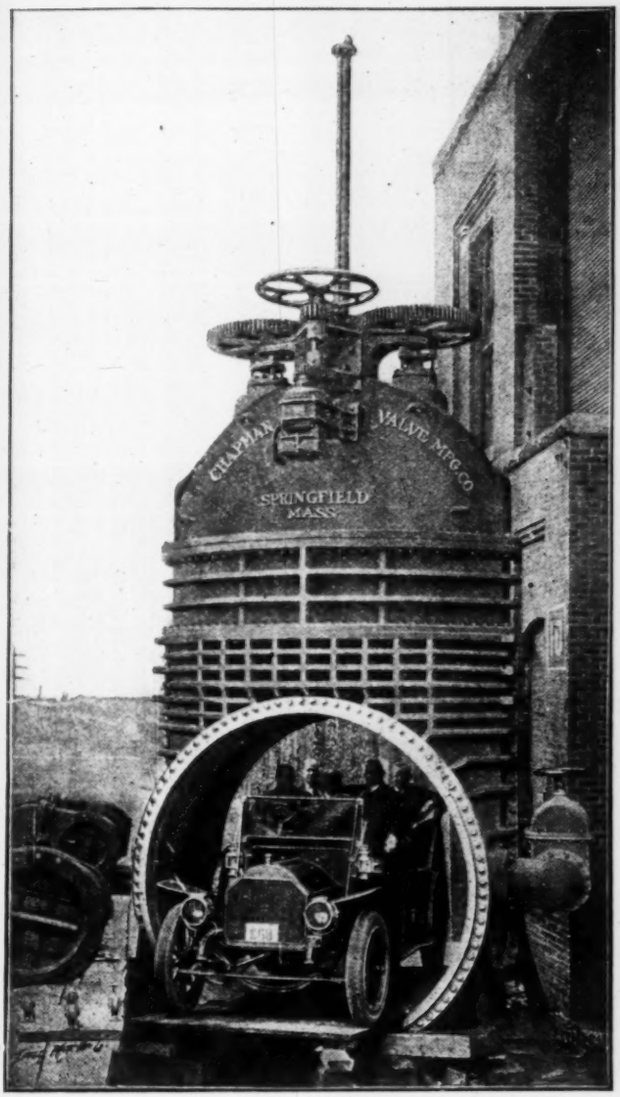
NEW YORK PHILADELPHIA BOSTON CHICAGO TULSA PITTSBURGH
LOS ANGELES DETROIT CLEVELAND SAN FRANCISCO

The Chapman

Indian Orchard

a Nine Foot Giant

Service Range of Every Phase Industry Deliver



Smallest Details on the Biggest Valves

require and receive the most careful consideration in the construction of CHAPMAN VALVES.

Ask for your free copy of the Chapman Valve Handbook No. 38

Valve Mfg. Co., Massachusetts

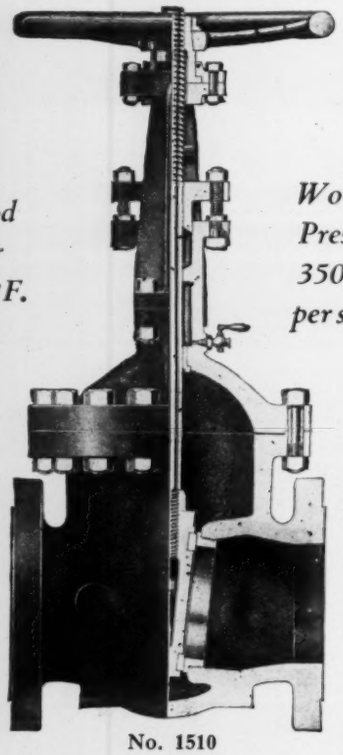
NELSON

Steel Gate Valve

Solid Wedge Construction

Good for 800° F.

Working Pressure, 350 lbs. per sq. in.



No. 1510

CYLINDRICAL body and bonnet. Full monel mountings. For high superheat and high-pressure steam. Can be furnished with by-pass. Sizes 2 to 18 inches.

NELSON VALVE CO.

Chestnut Hill, Philadelphia

Branch Offices

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BALTIMORE—8 E. Lombard St.
BOSTON—131 State Street
BUFFALO—582 Ellicott Square
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CLEVELAND—550 Kirby Bldg.
DETROIT—242 Larned St., West
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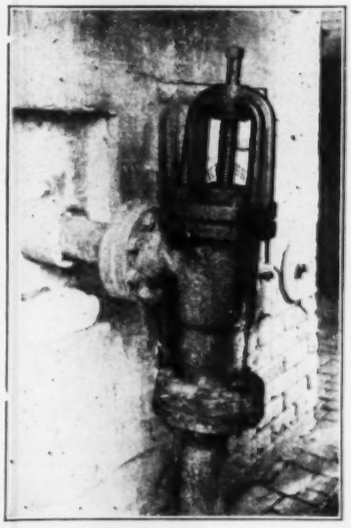
PITTSBURGH—517 Liberty Avenue
SAN FRANCISCO—75 Fremont St.
SYRACUSE—504 City Bank Bldg.

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

10 Years' Daily Blow-Off Service Without Repacking



The illustration—made from an unretouched photograph—shows a 3-inch angle flanged YARWAY SEATLESS BLOW-OFF VALVE in the plant of the Consumers Power Company, Cadillac, Mich.

This valve was installed in 1911, has been in continuous daily service ever since, and has never been repacked.

The engineer says it looks good for ten more years.

Do you experiment—or do you buy blow-off valves of proved worth?

Many power plants now use Yarway Seatless and Yarway Double Tightening Valves in tandem, where two valves are required on each blow-off line.

YARWAY

(formerly the Simplex)

SEATLESS BLOW-OFF VALVE

·YARNALL·WARING·COMPANY·

7614-20 Queen St.

Chestnut Hill··Philadelphia

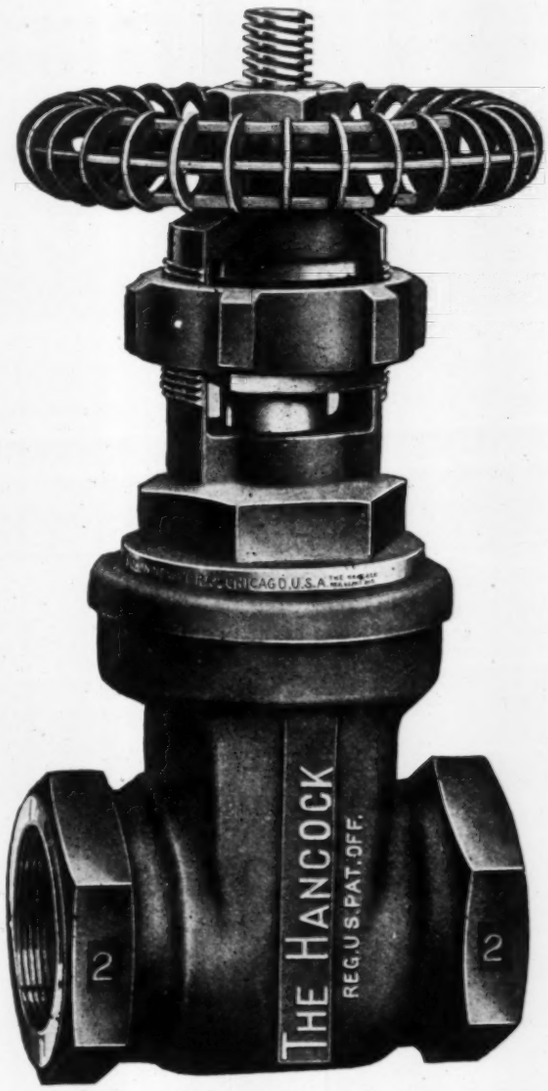
Representatives in all Principal Cities

For Complete List of Offices see Sweet's Engineering Catalog-Keystone Mining Catalog or Chemical Catalog

YARWAY SEATLESS BLOW-OFF VALVE YARWAY DOUBLE TIGHTENING BLOW-OFF VALVE YARWAY SKIMMER YARWAY ADJUSTABLE SPRAY HEAD YARWAY HYDRAULIC VALVE YARWAY UNLOADER YARWAY LEA V-NOTCH METER YARWAY PIPE CLAMPS ETC

YARWAY POWER PLANT DEVICES

Hancock Quality Applied To Gate Valves



Order one or more and compare them with any Gate Valve that you have ever seen

A Design Which Embodies All That Is Best In Modern Gate Valve Practice—

A design so good that the name "HANCOCK" can be put on it—a design that represents the last word in a Gate Valve for high pressure, high temperature service.

The Hancock Gate Valve is made with self-rising stem, yoke type bonnet, renewable seats and split wedge discs, either of bronze, nickel or monel, and with universal pressure packing gland. Bodies and yokes made of either the high grade temperature resisting bronze, which has made Hancock Valves famous, or of cast steel.

Hancock Gate Valves are all tested to 1000 pounds hydraulic pressure before shipment. They are made to withstand the most severe service to which a Gate Valve can be subjected.

MANNING, MAXWELL & MOORE INC.
HANCOCK WORKS
119 WEST 40TH STREET. NEW YORK, N.Y.
DISTRICT SALES OFFICES Chicago, Philadelphia, Boston, St. Louis, Pittsburgh, Cleveland, New Haven, Cincinnati, Buffalo, Syracuse, Detroit, Milwaukee, San Francisco, Seattle
VALVES · INJECTORS · INSPIRATORS · SAFETY VALVES · GAUGES · CRANES · MACHINE TOOLS · SUPPLIES

HV-35

HANCOCK VALVES

R
NoKut
PUMP VALVE
P
THE VALVE WITH THE PROTECTED SEAT

Design of the NoKut Pump Valve is Obviously Correct in Every Detail

Water passage through valve practically straight.

Flow freer than steam through a safety valve.

Beveled metal to metal seat.

Sealed by two flexible rubber rings. The higher the pressure the tighter the seals.

Low lift. Unusually large port opening. Therefore, no hammering, no breaking of springs; 15 to 20 per cent. greater pump speed.

No slippage, which insures full capacity, and high efficiency—always.

No rubber or composition disc to chip, erode, warp and leak.

Practically no maintenance cost.

Taken apart and put together without a tool.

Specified for water works pumps—and all others.

The harder the service the better you will like this valve.

Obviously the Only Correctly Designed Pump Valve

The Richardson-Phenix Co.
Manufacturers of High Grade Valves
Works: 130 Reservoir Ave., Milwaukee, Wis., U. S. A.

Here's a Pump Valve Service Record

Two Years with NoKut Pump Valves.

Three Days Longest with Others.

Working Conditions Same for All Valves.

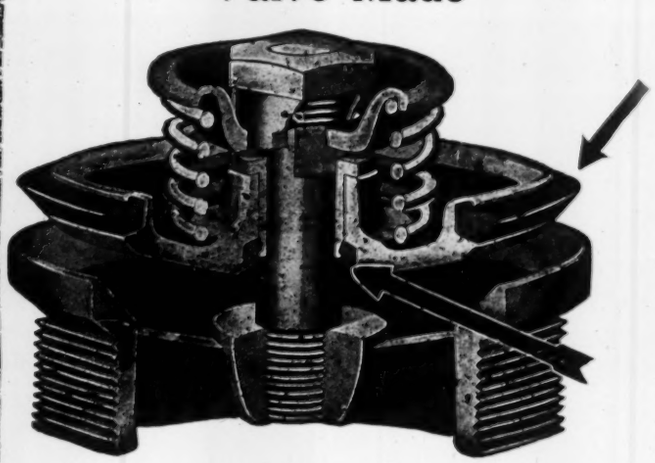
Place: A Wisconsin rubber works.

Conditions: 900 lb. pressure, fluctuating speed, 24-hour-day service.

Before putting NoKut valves in this pump the engineers renewed discs every Wednesday and Sunday, and sometimes nights between.

After NoKut valves were put in, the engineers did not open the valve chamber in TWO YEARS! After two years' service the NoKut valve seats are absolutely perfect.

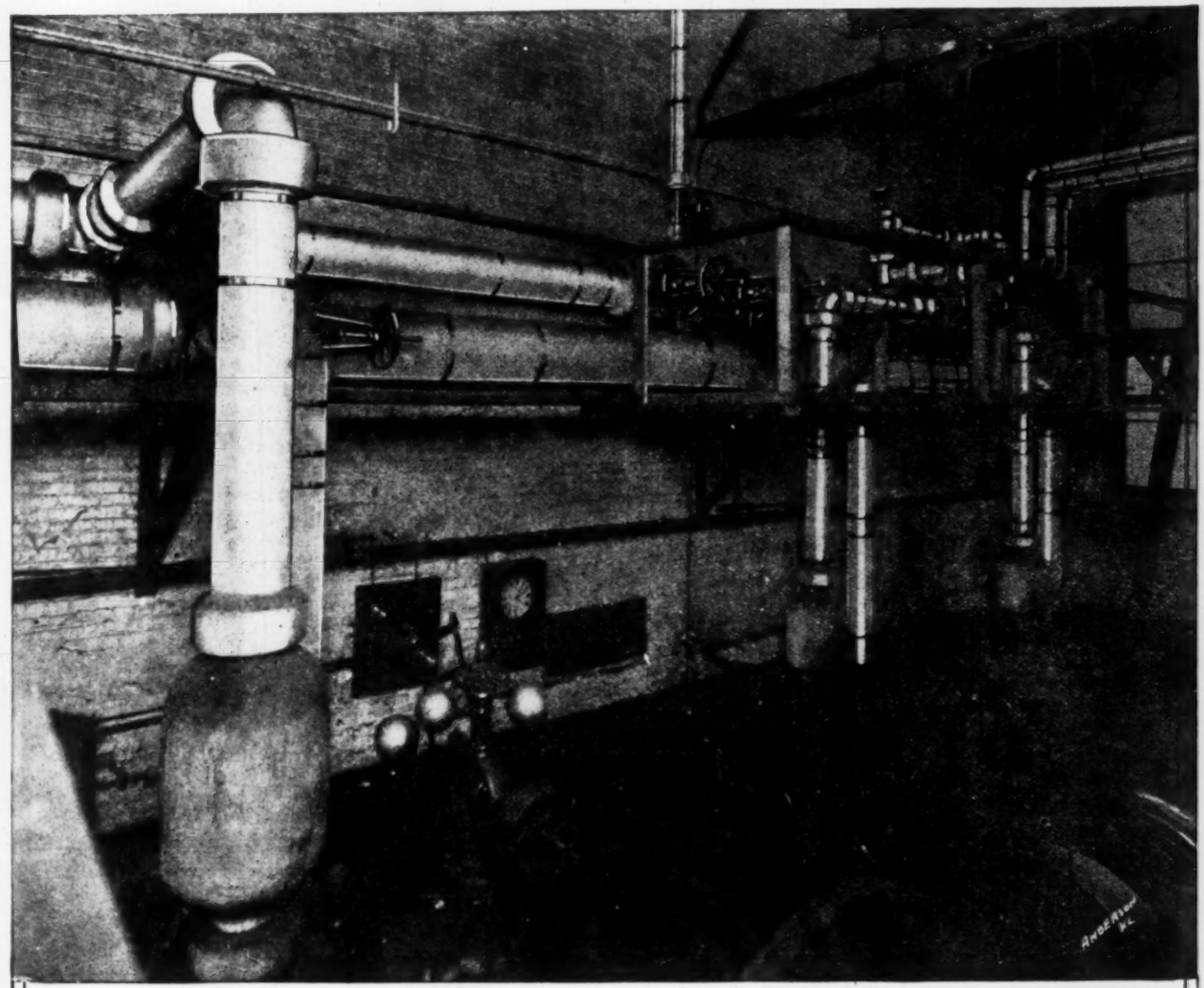
The Most Durable Pump Valve Made



Arrows Show the Sealing Rings

Your Copy of our descriptive Booklet is ready—write today

RP.-1



The proper selection of materials for heating systems will minimize corrosion and condensation trouble, and prevent hazards to plant and personnel.

CRANE
Piping Equipment

includes valves, pipe fittings and steam specialties, made of brass, iron, ferrosteel, cast steel and forged steel, in all sizes, for all pressures and all purposes, and insures dependable and continuous service.

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FOUNDED BY R. T. CRANE, 1855

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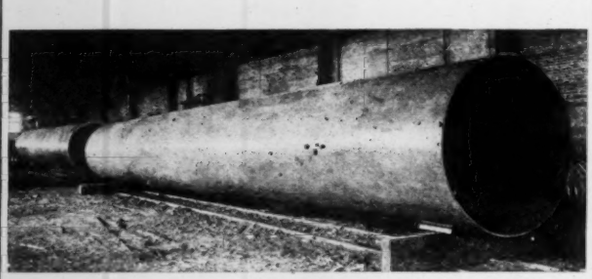


Lap-Welded Pipe 12″ to 72″ Dia.
Spiral Riveted Pipe 3″ to 42″ Dia.
Forged Steel Flanges.
Corrugated Marine Boiler Furnaces.

Taylor Seamless Forged Steel Boiler Nozzles

Sizes 1½″ to 8″ incl.

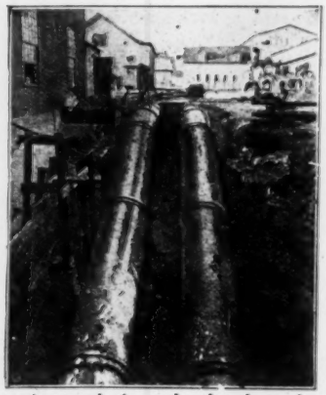
Bent to any required circle.

AMERICAN SPIRAL PIPE WORKS

New York Office, 50 Church St.

Main Office and Works, P. O. Box 485, Chicago.

Conveying Abrasive Material



Cast Iron Pipe

The greatest copper reclaiming plant in the world is that of the Calumet & Hecla Mining Co., on the shores of Torch Lake, an arm of Lake Superior. Fifty million tons of mill tailings, which have accumulated here during the past 50 years, and now being dredged and pumped out through the two lines of cast iron pipe shown here, at the rate of thousands of tons, daily, to the tanks in their ammonia leaching plant. No other pipe has been found to withstand this severe service so well.

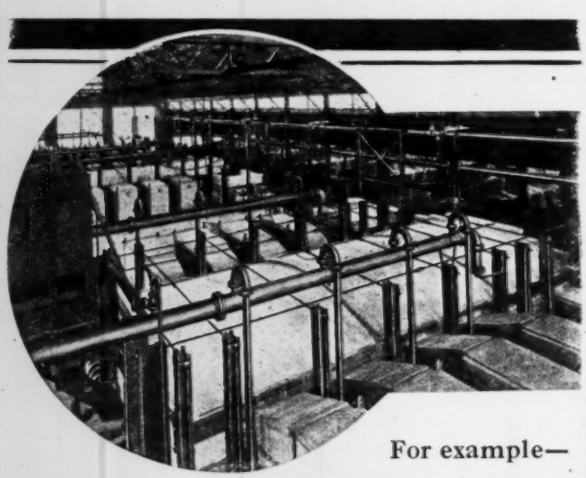
Write for Booklet

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

United States Cast Iron Pipe and Foundry Co.

General Office, Burlington, N. J.

INDUSTRIAL PIPING



For example—

The above installation of Steam and Gas Piping for the Owens Bottle Co. of Toledo at their Whitney Glass Works at Glassboro, N. J.

Let us tell you more about the importance of Industrial Piping. Refer to our data on Page 234 of the 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment or write for Bulletin M-11.

M. J. DOUGHERTY CO.
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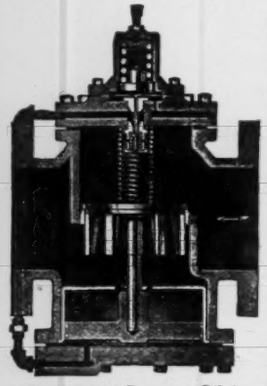

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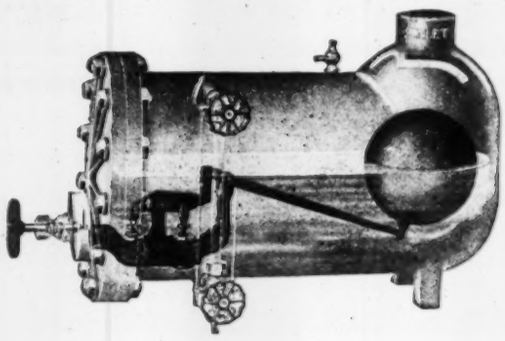

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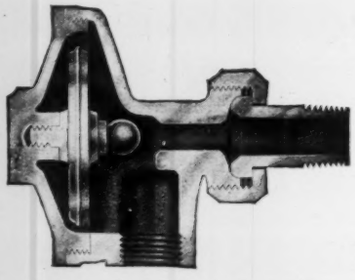

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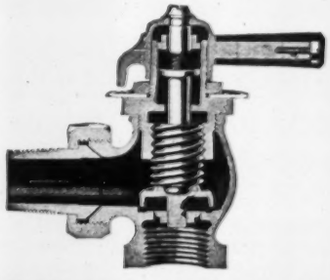

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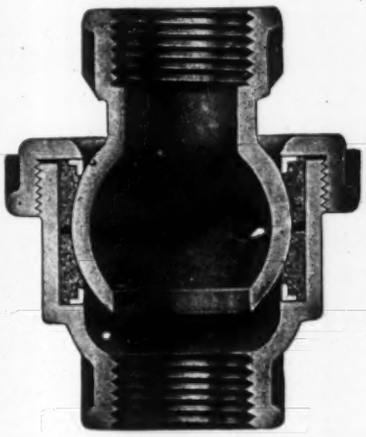

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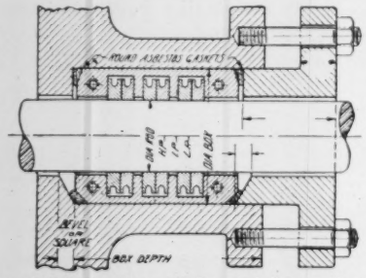

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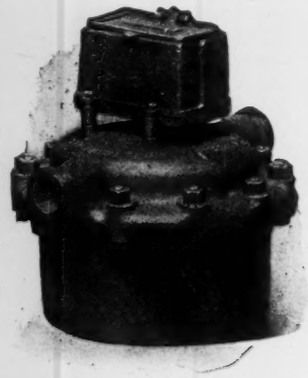

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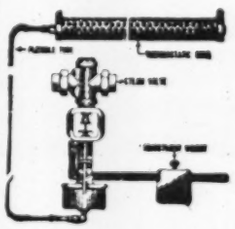

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(1154E)

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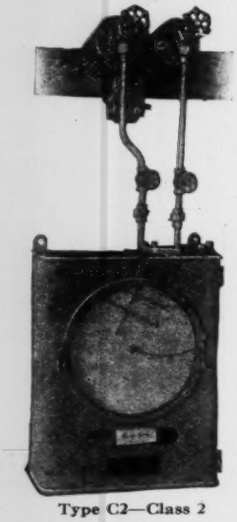

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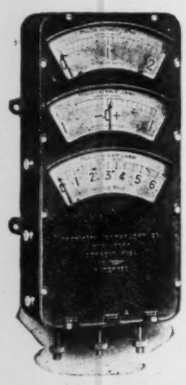

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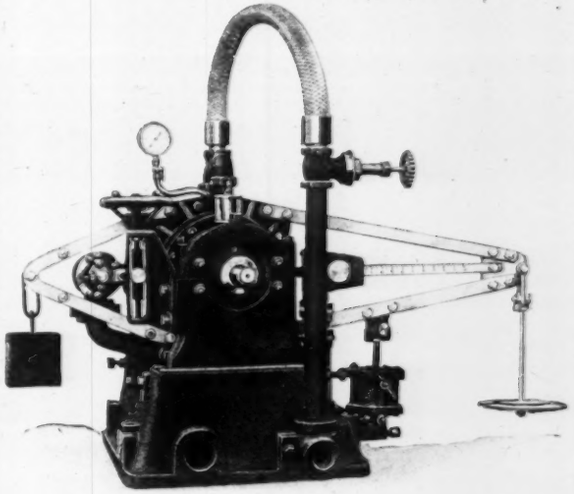

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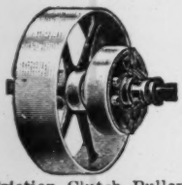

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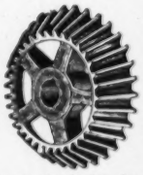

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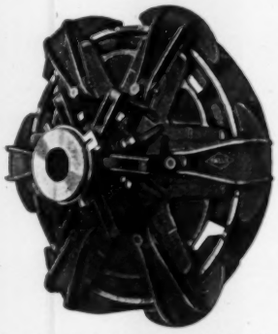

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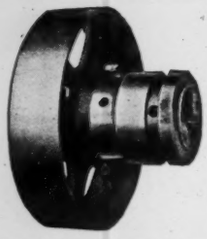
3

THE JOHNSON FRICTION CLUTCH



Single clutch with pulley mounted.

Friction Control Means Better Machinery.

Any friction drive can be handled most successfully by a Johnson Clutch.

Complete Engineering Service.

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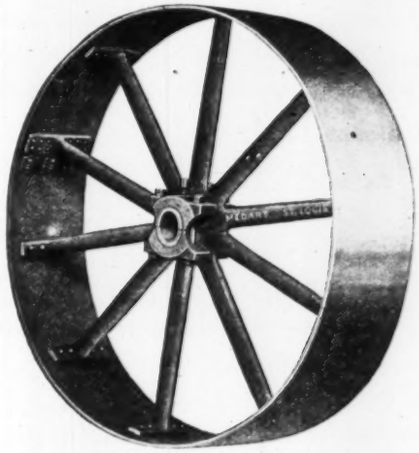

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Steel-Rim Split Pulleys

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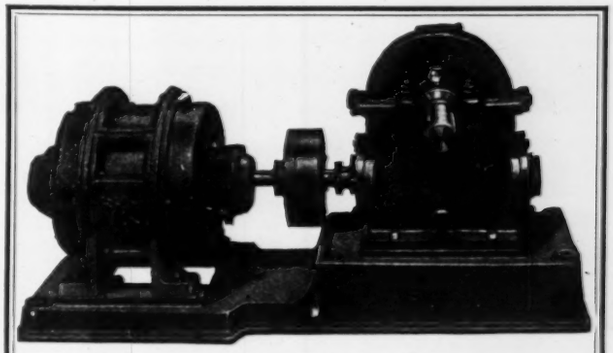

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For Power Transmission, the Hindley Worm-Gear Drive will meet your requirements.

Efficient, Safe, and Durable.

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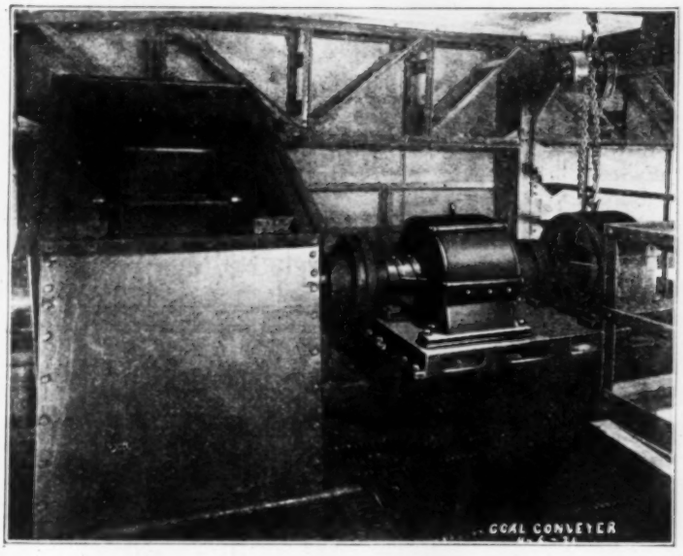
JAMES SPEED REDUCING TRANSMISSIONS



A James Spur Gear Speed Reducer operating Coal Conveyor in the Kelly Springfield Tire Co.'s Plant.

Look for our data on pages 310 and 311 in the 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment.

SEND FOR OUR BULLETIN NO. 7

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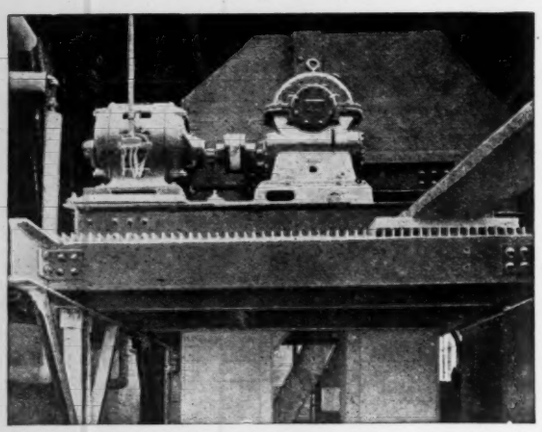
D. O. JAMES MFG. COMPANY

Manufacturers of Cut Gears of Every Description

1114-24 W. Monroe St. Chicago, Ill.

Speed Reduction



Cleveland Worm Gear Reduction Unit applied to bucket elevator.

Permanent Economy

Low first cost is no index to economy in speed reduction. What you want is permanent economy. Because of its ability to handle abnormal gear ratios, the Cleveland Worm Gear Reduction Unit permits the use of high speed industrial motors with permanent economy and immediate satisfaction.

Furthermore, the Cleveland Worm Gear Reduction Unit has established a universal reputation for low upkeep cost! This is based on two important facts:

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In addition they are easier to look after, offer greater compactness, greater durability, greater versatility, higher degree of quietness, and lowest maintenance cost.

Today you are buying to keep tomorrow's costs down, and factories that have used Cleveland Worm Gear Reduction Units for years always testify to their almost total absence of upkeep expense. True economy bids *you* investigate. Write us in reference to your speed reduction problem. We dont want you to have *Cleveland* Worm Gear Reduction Units unless you can get permanent economy through their use.

The Cleveland Worm & Gear Co.

America's Worm Gear Specialists

CLEVELAND, OHIO

Alfred H. Coates & Co., 251 Rialto Bldg., San Francisco, Cal.

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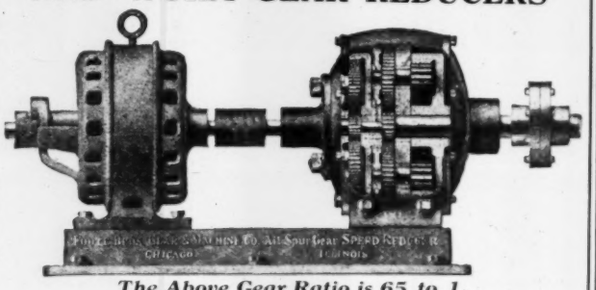
Cleveland
WORM GEAR
REDUCTION UNITS

FOOTE
SPUR GEAR
SPEED REDUCERS
AND WORM GEAR REDUCERS



The Above Gear Ratio is 65 to 1.

You Can Use Foote Speed Transformers in places where other means of reducing electric motor speeds would be impossible.

Find out about the many uses of Foote Speed Reducers.

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FOOTE BROS. GEAR & MACHINE COMPANY

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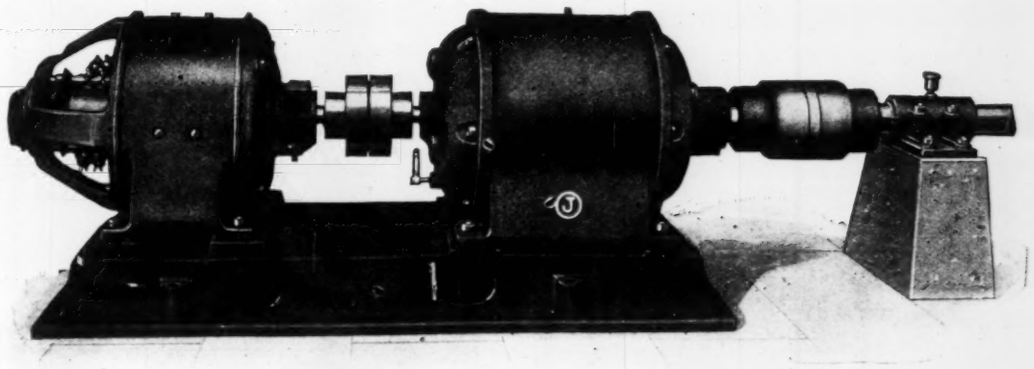


Jones Spur Gear Speed Reducer, with slow speed shaft connected directly to driven shaft by all-metal flexible coupling. Motor speed, 365 r.p.m. Final speed, 30.25 r.p.m. Reduction ratio, 28 1/2 to 1.

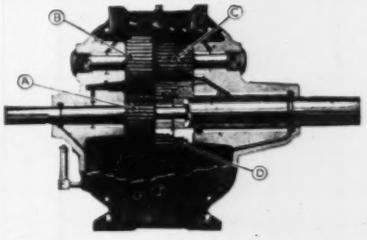
Compact—Simple—Durable

—*the Jones Spur Gear Speed Reducer*

Although it occupies very little installation space, the Jones Speed Reducer accomplishes reductions up to 200 to one, and over. A typical installation is shown above.

Its simplicity and durability are due to its mechanical correctness—demonstrated in the small illustration on the right. Three countershafts are evenly spaced about the drive and driven shafts, so that transverse loads due to tooth thrust are exactly balanced.

Just plain spur gear drive, with no internal gears or overhanging shafts.



A—Pinion meshes with and drives three gears B. B—Gears are mounted integral with the three pinions C. C—Pinions mesh with and drive slow speed gear D.

Our Engineers are at Your Service

W. A. Jones Foundry & Machine Company

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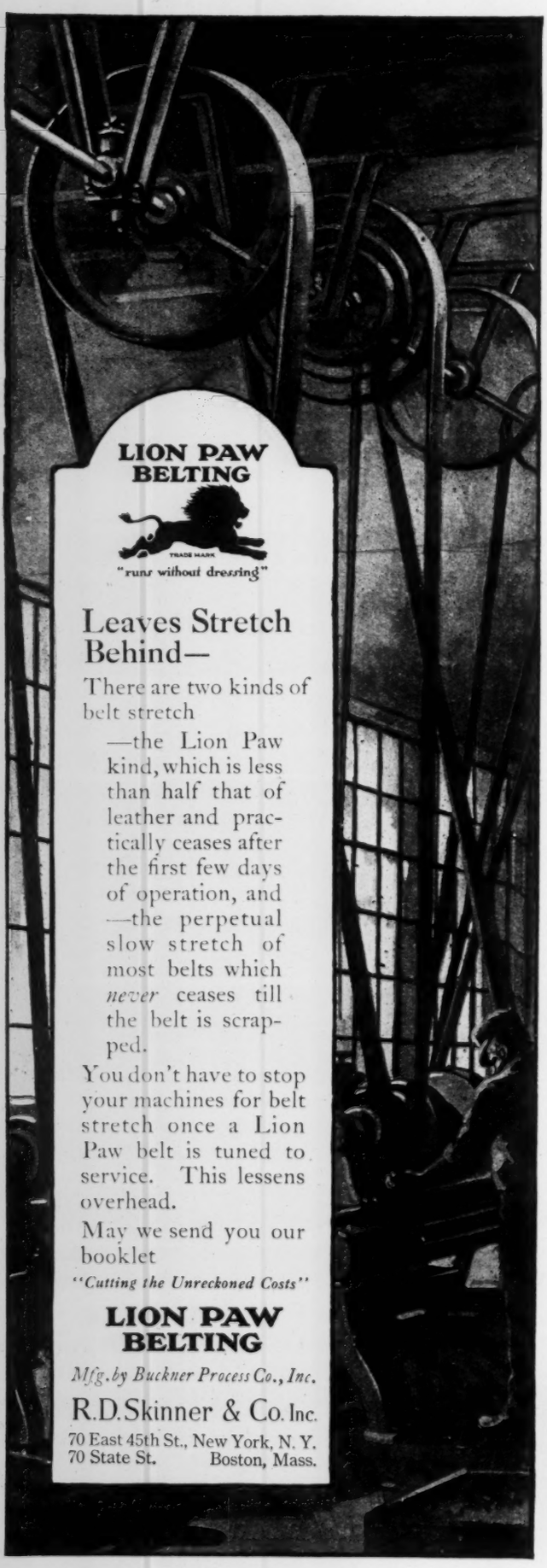
Jones

MEMBER OF AGMA

SPUR GEAR SPEED REDUCERS

J-158



Baldwin Roller Chain Drive on machine manufactured by Pierce Wrapping Machine Co.

ONE fine thing about the Baldwin Chain Drive is its adaptability—its ability to fit and function well where other drives cannot. This Baldwin Chain Drive on the Pierce Wrapping machine is a typical example of this quality.

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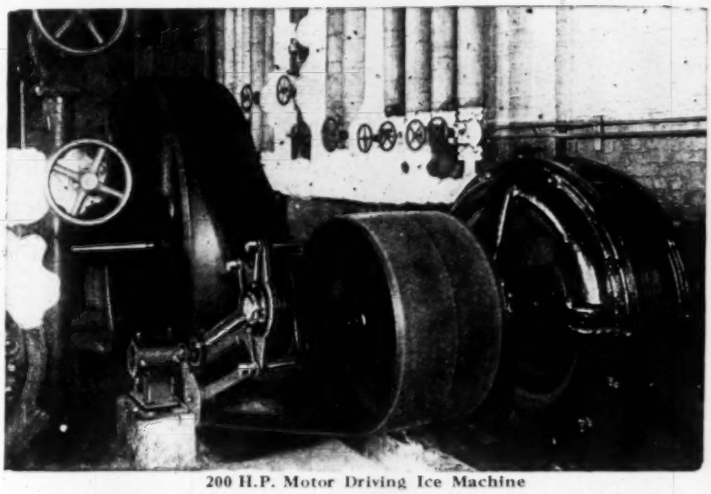

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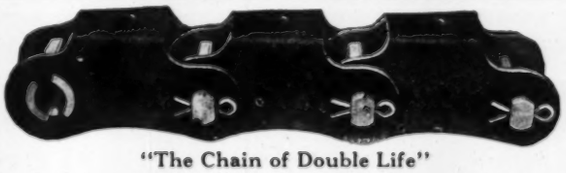

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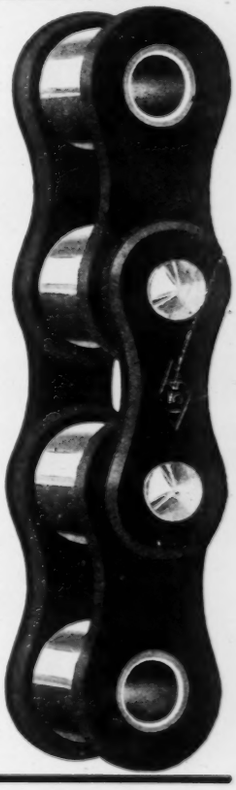

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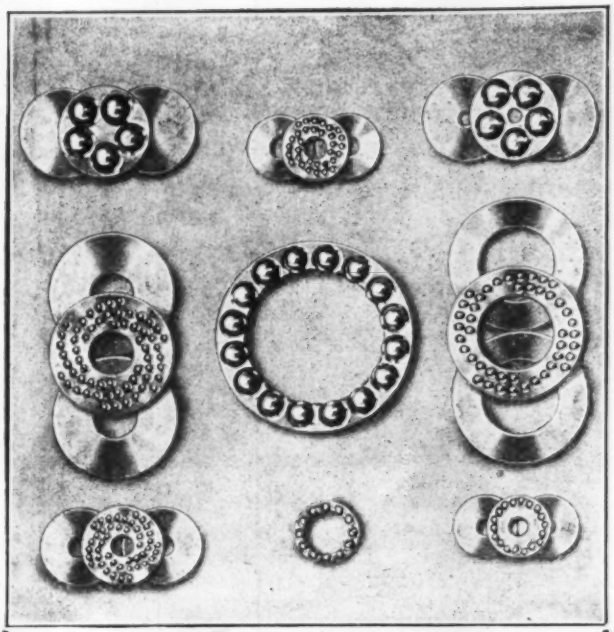

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ANY QUANTITY, ONE OR—ONE THOUSAND

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MECHANICAL ENGINEERING

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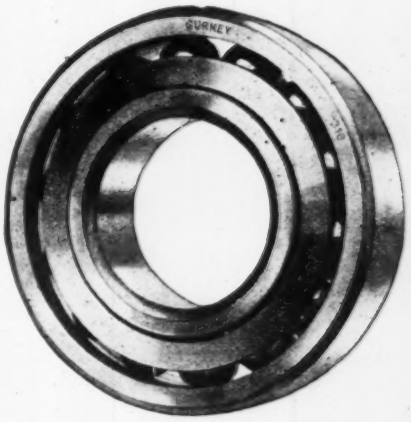

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THERE is a steadily growing class of manufacturers who are using ball bearings on the shafts and spindles of the machines they build. And there are a great many who do not use them. Why is the one class so keen for them and the other so set against them? The answer is—because of their experience with ball bearings.

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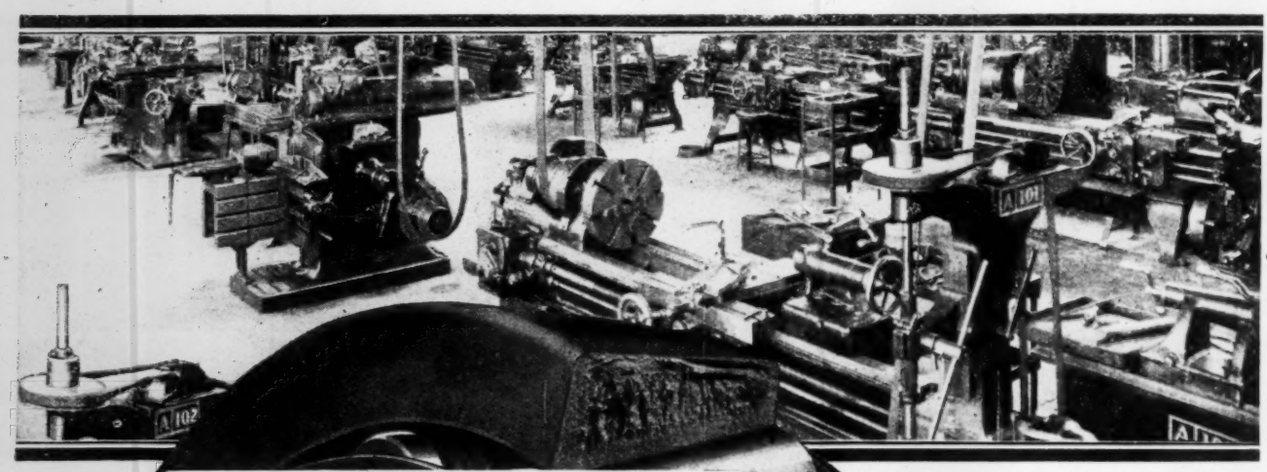

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Timken performance charts are laid out in years; and the service element in terms of hundreds of millions of revolutions at speeds of more than 3,000 r p m.

No one of the more than 60,000,000 Timken Tapered Roller Bearings now in service has been recommended for its service except on the basis of tried and known performance. Timken Tapered Roller Bearings are applicable in every industry

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Timken performance is quite readily accounted for because Timken Tapered Roller Bearings

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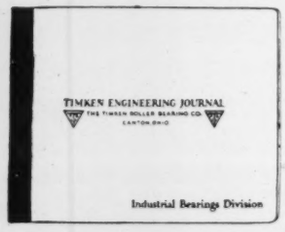

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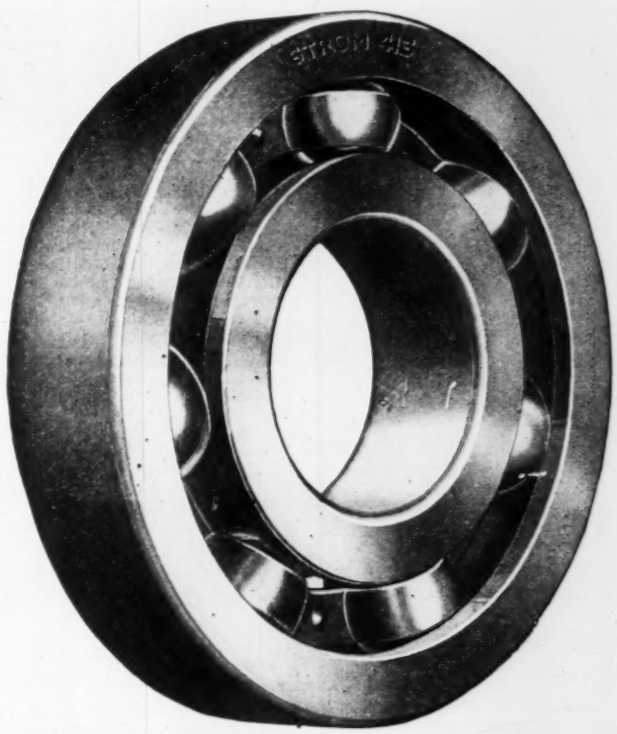

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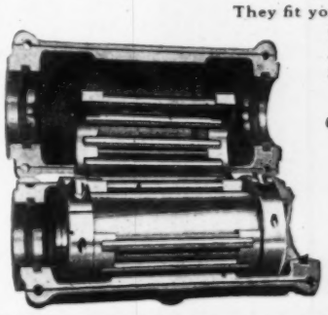

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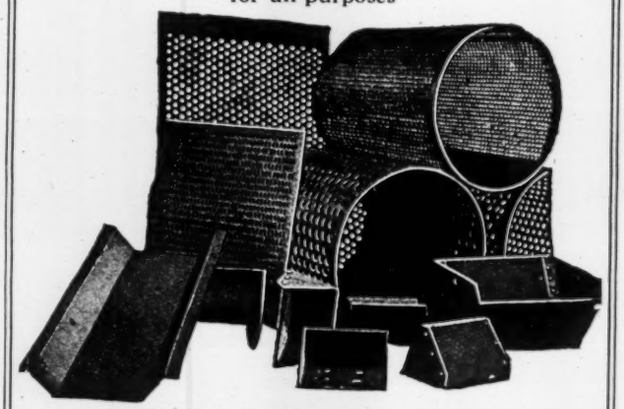

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Specialists in Dumbwaiters and Hand Power Elevators for more than a Quarter of a Century

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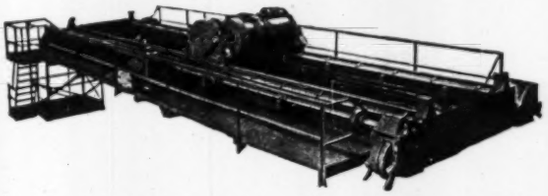
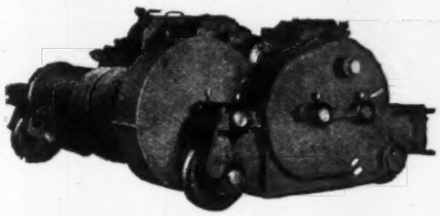
NORTHERN CRANES



Our type E Cranes for either standard or mill service will interest those who buy and use cranes. Enclosed non-overhung gearing—simple substantial design—Good workmanship—The "Repeat Order" Crane.



(Also Electric Hoists)

NORTHERN ENGINEERING WORKS
DETROIT MICHIGAN ~ U.S.A.

READING CHAIN & BLOCK CORP'N
READING, PENNA.

MANUFACTURERS OF

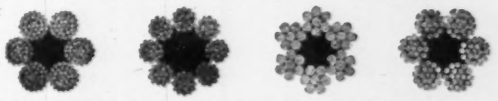
MULTIPLE GEAR
CHAIN HOISTS
ELECTRIC HOISTS
TRAVELING CRANES

READING C AND B PRODUCTS
MUST MAKE GOOD—OR WE WILL

See page 403 in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

ROEBLING

WIRE ROPE



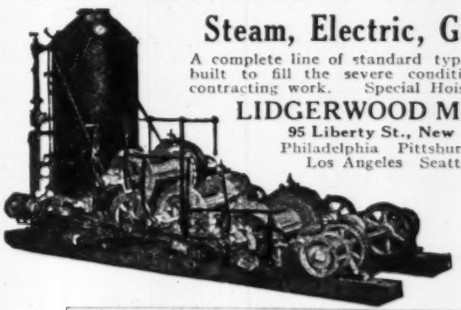
80 YEARS' EXPERIENCE IN WIRE ROPE MAKING
JOHN A. ROEBLING'S SONS CO., Trenton, N. J.
See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment

LIDGERWOOD HOISTS

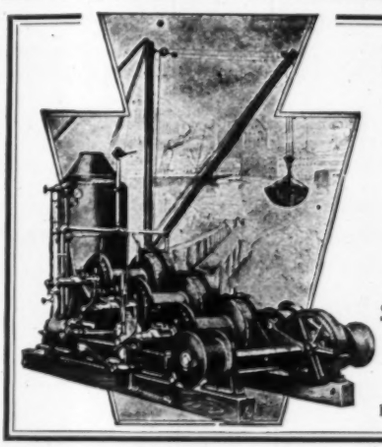
Steam, Electric, Gasoline

A complete line of standard types and sizes built to fill the severe conditions met in contracting work. Special Hoists to Order.

LIDGERWOOD MFG. CO.
95 Liberty St., New York
Philadelphia Pittsburgh Chicago
Los Angeles Seattle London



2 See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment



FLORY HOISTS

for

REHANDLING MATERIALS

A Flory Hoist for every purpose

S. Flory Mfg. Co.
Works, BANGOR, PA.
New York, 95 Liberty St.
Pittsburgh, House Bldg.
Chicago, Monadnock Bldg.
Hartford, Conn., K.B. Noble Co.

EQUIPMENT THAT SATISFIES

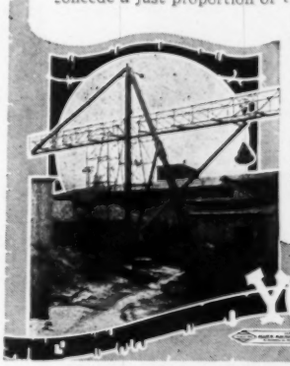
Building big out-door machinery that will produce practical results at minimum cost, means giving the most careful attention to construction details as well as endless study of production records.

Clyde supremacy in the building of workable machinery is based entirely upon results. It is true, results can be obtained with inefficient machines, but when an operator can show both results and satisfactory production cost, it is reasonable to concede a just proportion of the result to the equipment used.

Satisfied users of Clyde Machinery tell us interesting facts not only about costs but about performance.

The stiff leg derrick shown below is operated by Central Chemical Co. of Baltimore, Md., at Hagerstown, Md.

Complete detail information about any portion of the Clyde line furnished upon request.



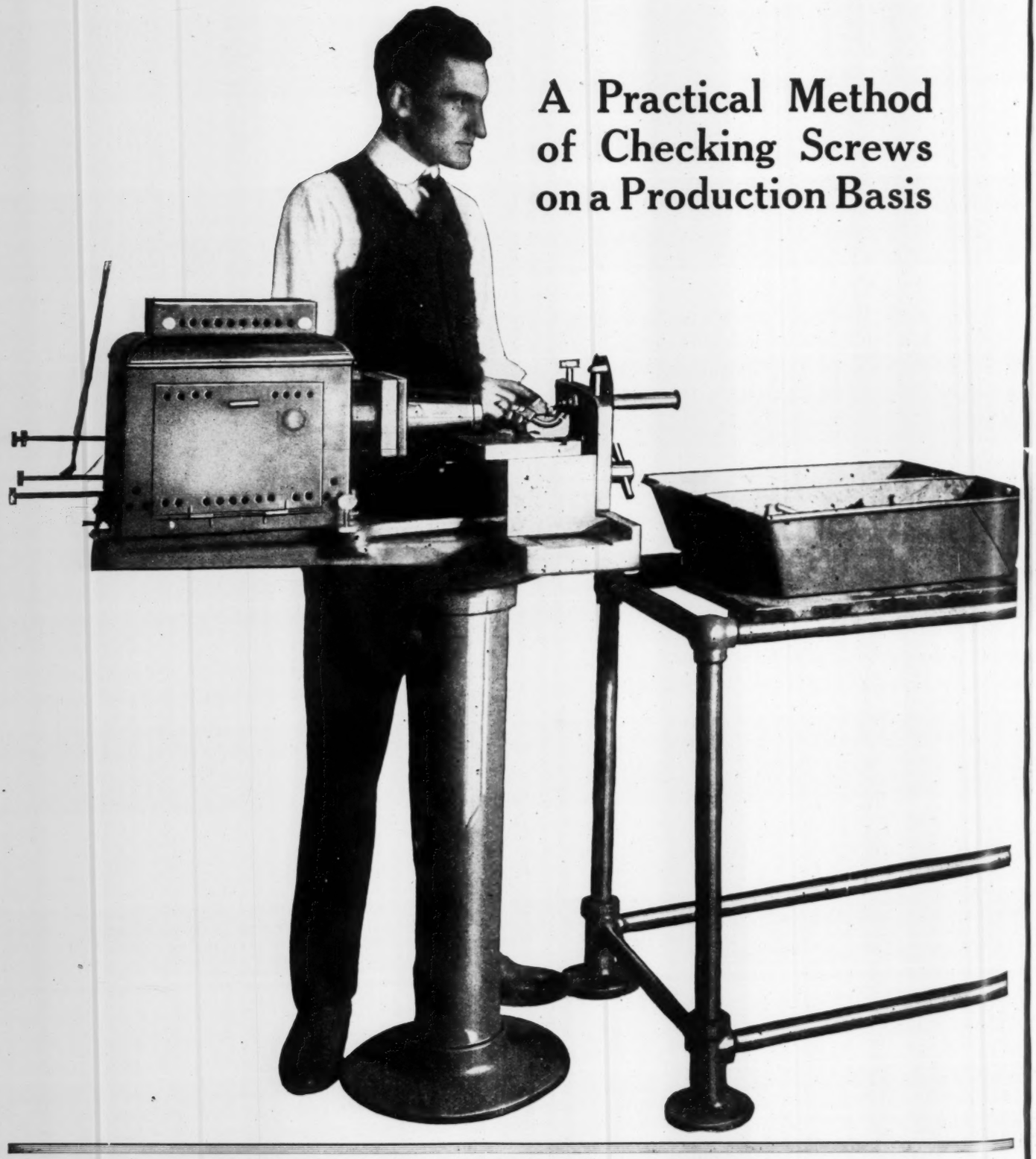
CLYDE
Your Guarantee

Clyde Iron Works Sales Company
DULUTH, MINN., U. S. A.

Sole Distributors for Clyde Iron Works

NEW YORK CHICAGO NEW ORLEANS JACKSONVILLE SEATTLE PORTLAND

THE HARTNESS SCREW



A Practical Method of Checking Screws on a Production Basis

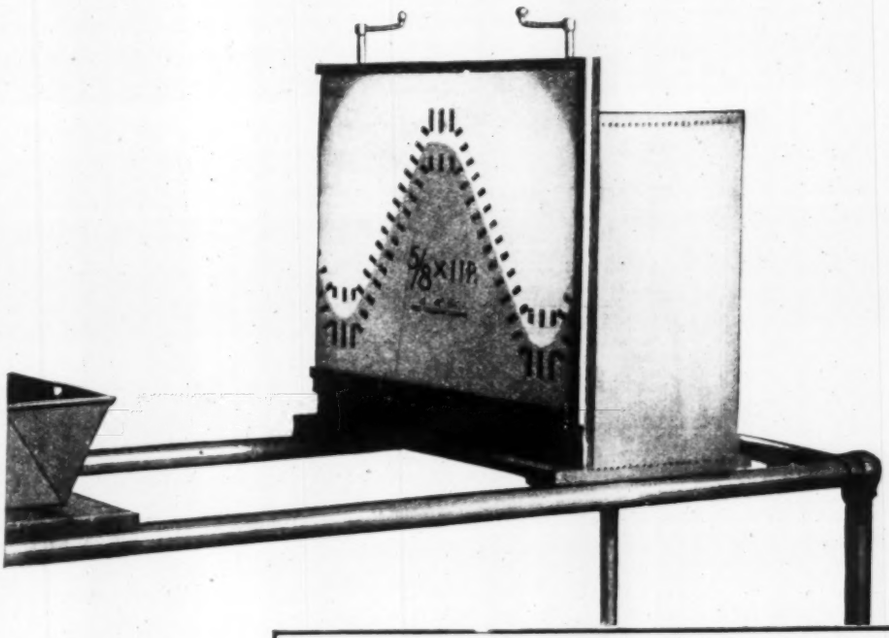
JONES & LAMSON

SPRINGFIELD, VERMONT, U. S. A.

503 Market Street, San Francisco, California.
F. Auberty & Co., 91 Rue de Maubeuge, Paris, France, Spain and Belgium.

THREAD COMPARATOR

Shows at a Glance Exactly What Is Wrong and Where—and How Much



Write on your business stationery or company letterhead for our new book which fully describes the Hartness Screw Comparator and demonstrates its application to modern interchangeable manufacturing.

In spite of the accuracy attained in machining thread gages, the screw thread is still a weak brother and will be so long as manufacturers depend on inadequate and expensive methods of inspection. The Hartness Screw Thread Comparator substitutes seeing for feeling—projects a highly magnified shadow of the thread onto a standard tolerance chart, where it shows the whole character of the thread, and permits its practical utility to be determined at a glance—at no less a rate than 500 screws inspected per hour.

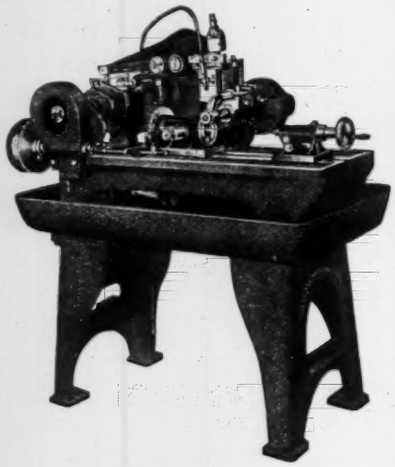
MACHINE COMPANY

9-10 Water Lane, Queen Victoria St., London, E. C.

Holland: Spliethoff, Beeuwkes & Co., Leuvehaven Wz. 159, Rotterdam. Japan, Korea, etc.; Mitsui & Co., Ltd., Tokyo. Australasia: McPherson Pty., Ltd., 554 Collins St., Melbourne. Sweden: A. Bol. Oscar Lindbom, Stockholm.

Gear Milling Machines
Gear Hobbing Machines

We specialize in machines for automatically cutting gears up to 10-inch diameter and as course as 8 pitch in steel. For Spur, Bevel, Spirals, Worm Gears, Worms, Special Shapes and Form Milling.

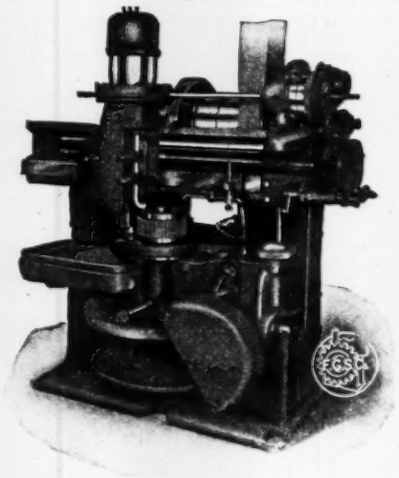


AUTOMATIC MILLING MACHINES
PLAIN MILLING MACHINES
PLAIN AND BALL BEARING DRILL PRESSES

Send for Catalog No. 15

THE BILTON MACHINE TOOL CO.
BRIDGEPORT, CONN.

The Fellows Spur Gear Shaper



This machine works on the generating principle, using a generating cutter that is ground all over after hardening, including the involute curves on the teeth which are generated with a precision that is beyond question.

The Fellows Spur Gear Shaper is designed for the economic and accurate production of spur, external and internal gears, shoulder gears, cluster gears, cams and a large variety of work.

A complete description of this machine and a list of examples illustrating its many possibilities is given in our general catalog "Commercial Gear Cutting," a copy of which will be gladly sent to those interested.

THE FELLOWS GEAR SHAPER COMPANY
Springfield, Vermont, U. S. A.

1 See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment

MACKINTOSH-HEMPHILL CO.
PITTSBURGH, PA.

ROLLING MILLS
ENGINES
HYDRAULIC PRESSES
STEEL and *MANGANITE* ROLLS
CAST & MACHINE CUT GEARS
SHEARS PUNCHES SAWS

LANDIS MACHINE COMPANY, Inc.
WAYNESBORO, PA.

Manufacturers of

Bolt and Pipe Threading Machinery

Let our Engineering Department solve your threading problems. Send your specifications today.

Catalogues upon request.

A complete discussion of the Landis chaser, die head, and machine will be found on pages 496 and 497 of the 1921 volume of A.S.M.E. Condensed Catalogues of Mechanical Equipment.

ROGERS ADJUSTABLE LIMIT GAUGES

Maximum working accuracy and minimum tool-room costs are assured by the ROGERS MASTER LOCKING DEVICE (Patented)

Adjusting and locking screws are set in sockets for sealing with wax in the tool room, and cannot be touched in the shop without the seal becoming broken. Anvils are of tool steel hardened, ground and lapped, with ample measuring surfaces. Marking plates are screwed to frame; and may readily be replaced when anvils are re-set to different measurements. Range of sizes 0" to 8". Write for prices.

Manufacturers also of Gauges and other Measuring Appliances. Solid Adjustable-Blade Reamers. Adjustable-Blade Hollow Mills.

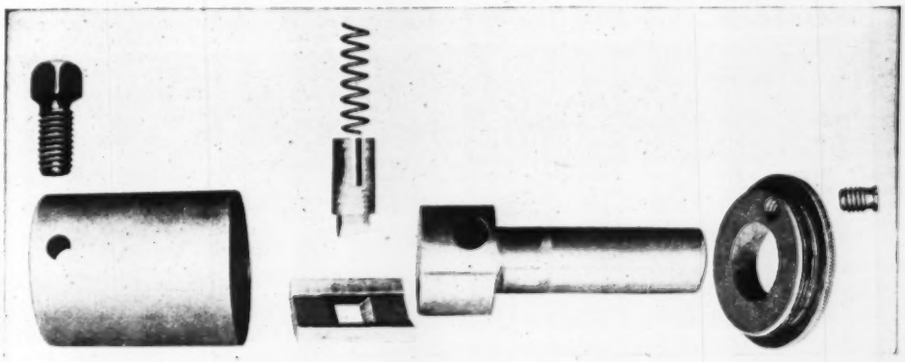
Established 1865

The John M. Rogers Works **Gloucester City, N. J.**

The R. K. LeBlond Machine Tool Co.
CINCINNATI, OHIO

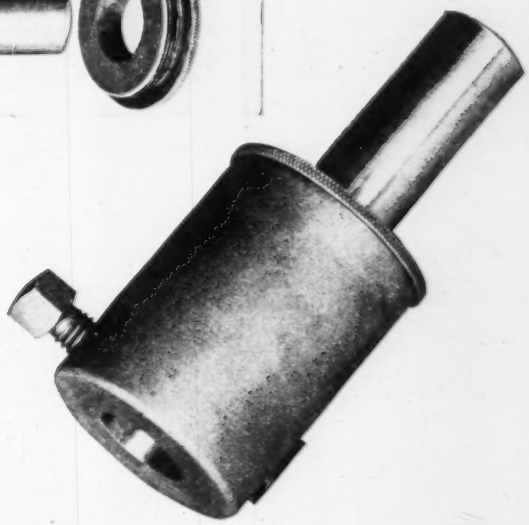
We manufacture a complete line of Heavy Duty Lathes and Milling Machines. They are scientifically designed, so the power is limited only by the strength of the cutting tool. It will pay you to investigate our machines.

Catalog upon request



All the Parts—Simple—isn't it!

New Clutch Tap and Die Holder



The new Clutch Tap and Die Holder
is two tools in one,—that is,
Holds either right or left hand dies or taps
Is easy to change from right to left
Easy to take apart to clean and oil
So simple there is nothing to go wrong
A tool necessary in every Machine Shop
Works like a charm. Write us for details.

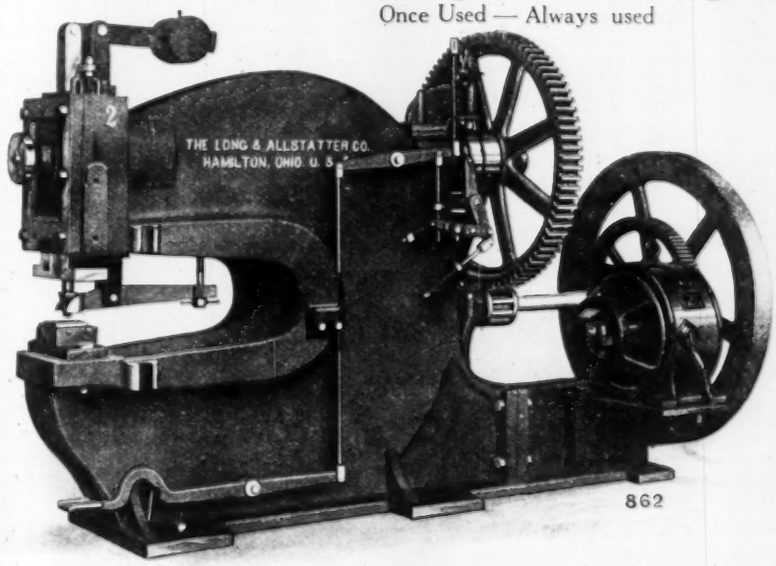
The Warner & Swasey Company
Cleveland, U. S. A.

See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment

THE QUALITY LINE

of Power Punching and Shearing Machinery

Once Used — Always used



No. 2 Single Machine

OUR LINE COMPRISES:

- Single and Double End Punches
- Angle Iron Shears
- Bar Iron Shears
- Gate or Guillotine Shears
- Plate Splitting Shears
- Alligator Shears
- Horizontal Punching and Bending Machines
- Multiple Punches
- Structural Punches
- Board Drop Hammers
- Helve Hammers, Etc.

Write us regarding your requirements

THE LONG & ALLSTATTER CO.

American Punch and Shear Works
HAMILTON, OHIO, U.S.A.

See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment

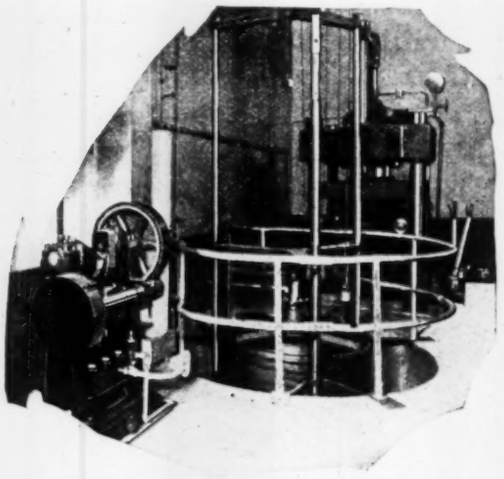
HYDRAULIC EQUIPMENT
For Every High Pressure Purpose

A Difficult Pressing Problem.

The illustration shows a complete H-P-M hydraulic installation,—press, pump, accumulator, valves and fittings, in operation in one of the largest industrial laboratories in the country.

The press shown in background is used for making a special form of metallic briquette. The metal which is in powdered form is placed in a mould. The mould is in two pieces and is not bolted. The base of the press is so designed that a side ram operated hydraulically clamps the mould together and holds it in place while the upper ram exerts a pressure of 500 tons on the material. Both upper and side rams have hydraulic pull back cylinders.

These and similar pressing problems which we have solved, guarantee our ability to meet your "pressing needs," no matter how out-of-the-ordinary they may be. Tell us what you wish to press. We will submit catalogs, drawings and estimates.



Partial List of H-P-M Users

Abrasive Material Co.
Baldwin Locomotive Co.
Carnegie Steel Co.
Eastman Kodak Co.
William Edwards Co.
Ford Motor Car Co.
Morton Salt Co.
Jeffry Mfg. Co.
Rudolph Wurlitzer Co.
Western Electric Co.
Pollak Steel Co.
American Sheet & Tin Plate Co.
Black Diamond Powder Co
Buick Motor Car Co.
Detroit Press Steel Co.
Edison Phonograph Works
Goodyear Tire and Rubber Co.
Hudson Motor Car Co.
Imperial Japanese Navy
National Lamp Works
Memphis Street Railway Co.
New York Central Lines
Pennsylvania Railroad Co.
Westinghouse Electric & Mfg. Co.

The HYDRAULIC PRESS MFG. CO.
MOUNT GILEAD, OHIO, U. S. A.

New York Buffalo Cleveland Detroit San Francisco

"FOR - YOUR - PRESSING - NEEDS"

Another Big "BLISS" at "Hydraulic"

Hydraulic Pressed Steel Co., of Cleveland, are regularly turning out 1000 automobile rear-axle housings per 8 hour day on this "BLISS" No. 81½ Straight-Side Press. The operation shown is the final drawing. The material is Open Hearth Steel. Two men operate. The great size and strength of this press can be seen by comparing it with the workman.

BLISS 1857

E. W. BLISS CO.

BLISS 1921

Main Offices: BROOKLYN, N. Y., U. S. A.

American Factories: BROOKLYN, N. Y., HASTINGS, MICH., CLEVELAND, O., SALEM, O.

SALES OFFICES

CHICAGO, People's Gas Bldg. DETROIT, Dime Bank Bldg. CLEVELAND, Union Bank Bldg.
CINCINNATI, Union Trust Bldg. NEW HAVEN, Second National Bank Bldg. BUFFALO, Marine Bank Bldg. ST. LOUIS, Boatmen's Bank Bldg.
PITTSBURGH, Keenan Bldg.

No. 75

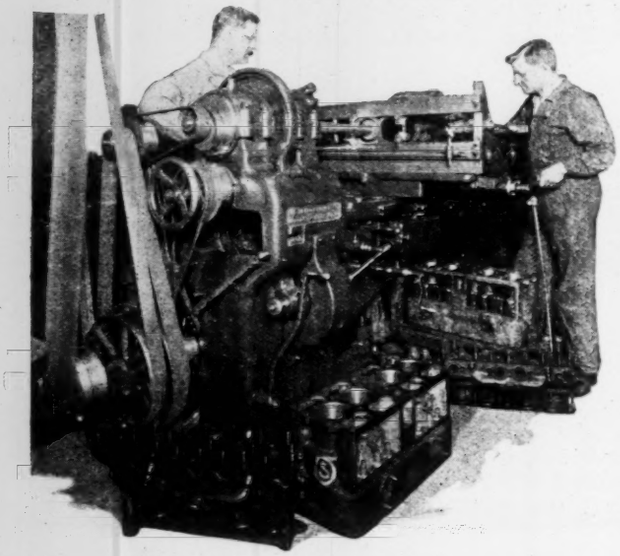
FOREIGN SALES OFFICES *and* FACTORIES

LONDON, ENGLAND, Pocock Street, Blackfriars Road, S. E. PARIS, FRANCE, 100 Boulevard Victor-Hugo, St. Ouen

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

HEALD

Cylinder Regrinding Not a Side Line But a Business



The photograph shows the Heald No. 55 in the Orteig Motor Co. plant. They are regrinding the cylinders for a 5-ton Walters Motor Truck. This is a pretty husky block, but the capacity of the Heald No. 55 permits it to be handled with ease.

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

So profitable has cylinder regrinding proven to many shops, that instead of its being a side line it has developed into a regular business. There are still a large number of localities that are untouched and the first one in the field will get the cream of the trade.

The Heald Grinder is simple, self contained, with a large capacity and sold at a moderate figure. It is a life saver to many who are at present feeling the business depression.

It is particularly suited to small machine shops, automobile repair shops and welding concerns who are located, already have nearly all equipment needed and with operators to handle the work satisfactorily.

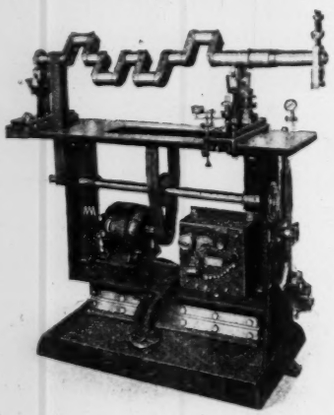
Cylinder grinding is one of the most active mechanical lines in the country at the present time.

Are you going to get your share of this business that is now going begging? You know your profits of two years back—you also know where you stand today. Better get in touch with us and learn the possibilities of the regrinding field.

The Heald Machine Co.

26 New Bond St. Worcester, Mass.

Branches at New York, Philadelphia, Cleveland, Buffalo, Detroit, Chicago, Cincinnati



Vibrations

THEIR CAUSE AND CURE.

Have you given them the consideration they deserve?

DON'T IGNORE THEM.

If you are attempting to do so, you are inviting disaster.

For four years we have been supplying a most satisfactory means of eliminating vibrations due to lack of balance.

The NWA BALANCING MACHINE has an unsullied record of success. Every machine sold is giving its purchaser consistent and satisfactory service. Not one has ever been discarded. See it at the Auto Shows.

It's worth your investigating.
How about torsional vibrations?

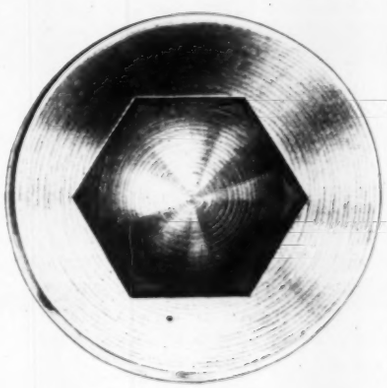
WE SOLVE VIBRATION PROBLEMS
Trade Mark Registered

VIBRATION SPECIALTY COMPANY
N. W. AKIMOFF, President.

Harrison Building
Philadelphia, U. S. A.

The corner triangles in the bottom

Identify—



The 30% Stronger Hollow Set Screw

Look in the bottom of the socket-hole: At the corners are little triangular "pits," left by the hexagon punch in the Allen process of cold-drawing.

First the socket-hole is drilled; you'll see the drill marks on the bottom. Then a solid hex. punch (of the same diameter) fits down into the hole and drives the "blank" through a die, compressing the metal around the hexagon shaft—*forming the socket.*

In the corner triangles the angular edges of the punch leave their mark. And that is the mark of an Allen screw; essential evidence of the Allen process; your guide in getting the right article.

This doesn't tell you much about the advantages of USING "Allens," but we'll gladly send you an interesting booklet that will (not forgetting the price list!).

THE ALLEN MFG. CO.
131 Sheldon Street, Hartford, Conn.
Pacific Coast Branch Office: The Charles A. Dowd Sales Co., 320 Market St., San Francisco, Calif.

Among men who work metal—

there's no question about the accuracy and quality of a Starrett precision tool. The experience of two generations of machinists with Starrett Tools has demonstrated that these tools are consistently dependable.

Write for Starrett Catalog No. 22 "LD." Sent free upon request.

THE L. S. STARRETT COMPANY
The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled
ATHOL, MASS.

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

42-257

Starrett Tools

BUY IT FROM THE NAVY

Naval Vessels as Hulks for Salvage

By Sealed Proposals opening January 16, 1922
At Board of Survey, Appraisal and Sale,
Navy Yard, Washington, D. C.

Improvements in Naval construction have rendered these fine old warships obsolete, and the opportunity is now being given the metal trades to purchase for salvage the following vessels:—

Some of the Vessels Offered for Salvage

(Note.—Displacement given below is for full load.)

U. S. S. MAINE (Battleship). Built in 1901.
Length, 393 feet; draft, 23 feet; beam, 72 feet.
Displacement, 13,500 tons. Now at Philadelphia, Pa.

U. S. S. MISSOURI (Battleship). Built in 1901.
Length, 394 feet; draft, 24 feet; beam, 72 feet.
Displacement, 13,500 tons. Now at Philadelphia, Pa.

U. S. S. WISCONSIN (Battleship) Built in 1898.
Length, 374 feet; draft, 24 feet; beam, 72 feet.
Displacement, 12,150 tons. Now at Philadelphia, Pa.

*U. S. S. BROOKLYN (Cruiser). Built in 1895.
Length, 402 feet; breadth, 65 feet; draft, 24 feet.
Displacement, 10,068 tons. Now at Mare Island, Cal.

*U. S. S. COLUMBIA (Cruiser). Built in 1892.
Length, 413 feet; draft, 23 feet; beam, 58 feet.
Displacement, 7,387 tons. Now at Philadelphia, Pa.

U. S. S. MEMPHIS (Cruiser). Built in 1903.
Length, 504 feet; draft, 25 feet; beam, 73 feet.
Displacement, 15,712 tons.
Now a wreck at Santo Domingo, D. R.

TARGET (Ex-Monitor PURITAN). Built 1882.
Length, 299 feet; draft, 18 feet; beam, 60 feet.
Displacement, 6,060 tons. Now at Norfolk, Va.

U. S. S. OZARK (Monitor). Built in 1900.
Length, 225 feet; draft, 13 feet; beam, 50 feet.
Displacement, 3,356 tons. Now at Philadelphia, Pa.

TARGET (Ex-Monitor MIANTANOMOH). Built in 1876.
Length, 263 feet; draft, 14 feet; beam, 55 feet.
Displacement, 3,990 tons. Now at Norfolk, Va.

U. S. S. TONOPAH (Monitor). Built in 1900.
Length, 255 feet; draft, 13 feet; beam, 50 feet.
Displacement, 3,356 tons. Now at Philadelphia, Pa.

*U. S. S. SMITH (Destroyer). Built in 1909.
Length, 294 feet; draft, 8 feet; beam, 26 feet.
Displacement, 902 tons. Now at Philadelphia, Pa.

*U. S. S. ALBERT BROWN (Fish Boat). Built in 1897.
Length, 103 feet; draft, 10 feet; beam, 18 feet.
Gross tonnage, 108 tons. Now at Philadelphia, Pa.

U. S. S. ORIOLE (Ex-DALE); Wooden Sailing Vessel. Built in 1839.
Length, 117 feet; beam, 34 feet.
Now at Coast Guard Depot (S. Baltimore, Md.)

NOTE.—The vessels marked with an asterisk (*) will on December 15, 1921, be offered for sale for "Conversion to Commercial Uses." Such vessels as are not sold on that date will be offered on January 16, 1922, for sale as "Hulks for Salvage."

The offer of these vessels by the Navy Department for sale to commercial organizations should be considered from the standpoint of a nucleus to go into the ship breaking up field for some *"farsighted concern" looking for new business.*

Aside from the ferrous and non-ferrous metals entering into Naval ship construction, consider the electrical machinery, pumps, winches, boilers, engines, piping, etc., for which there is always a receptive market with an attractive recovery.

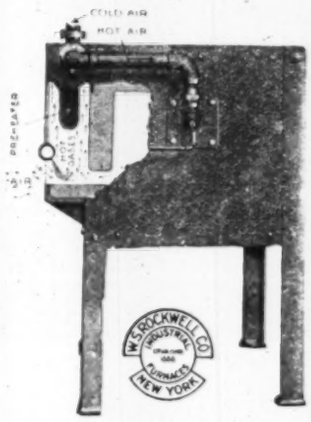
A careful investigation of the success recently achieved in foreign countries by *"ship breaking"* concerns will convince you of the advisability of promptly communicating with the Navy Department.

Write or wire for catalog No. 27-46b giving the terms of sale and describing the vessels offered.

Central Sales Office

NAVY DEPARTMENT WASHINGTON, D. C.

IDLE MEN IN FORGE SHOPS



(Patented)
Section showing deflection of hot gases, *with induced air toward the furnace, for protection of the operator*, and the preheating of air for combustion.

When men are idle, expensive equipment and buildings are also idle.

In past summers, the unbearable heat that caused prolonged shutdowns in many forge shops was **often due to faulty forges or improper application and utilization of the heat.**

To relieve these conditions, progressive forge shops are installing Rockwell Economizer Forges.

These forges enable the men to *work steadily and in comparative comfort.* They also afford other advantages in the way of *decreased operating cost, better quality of product,* and *decreased floor space.*

Bulletin 239-U, dealing with improved methods of heating and handling material, layout of equipment, and other factors influencing the cost of production, may be had by writing to our nearest branch.

W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors
50 Church St. (Hudson Terminal Building) **New York**
WE MAKE INDUSTRIAL HEATING FURNACES
FOR EVERY REQUIREMENT.
COAL—OIL—GAS—ELECTRICITY
"FURNACES AND FUEL TO SUIT CONDITIONS"

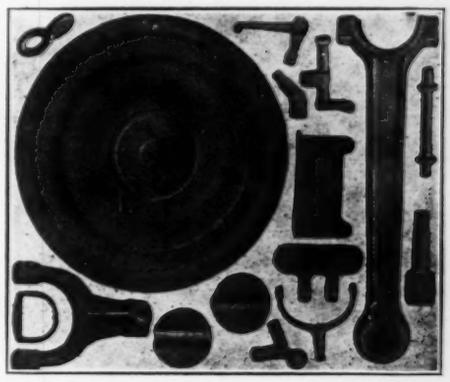
BRANCHES:
Chicago, Ellsworth Bldg. Cleveland, Engineers' Bldg. Detroit, Majestic Bldg.

AMERICAN DROP FORGINGS

Any Size. Any Analysis. Carbon or Alloy Steel.

Furnished Annealed or Heat Treated.

See data on pages 430 and 431 of the 1921 volume A.S.M.E. Condensed Catalogues of Mechanical Equipment.



Send blue prints or write us requesting our Engineer to call. He can undoubtedly help you with suggestions regarding design, quality and cost.

THE AMERICAN FORGE & MACHINE CO.

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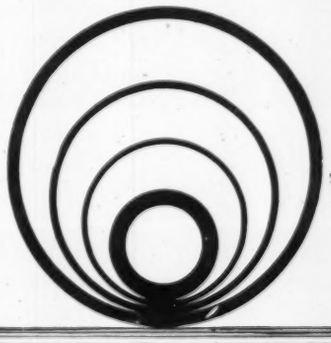

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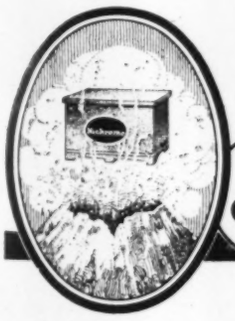

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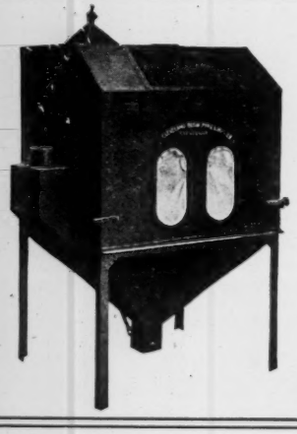

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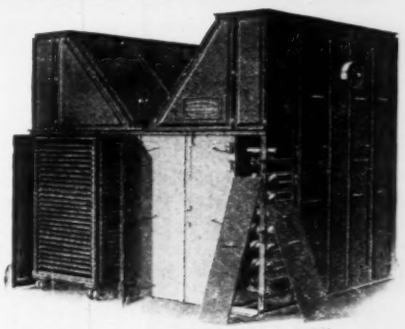

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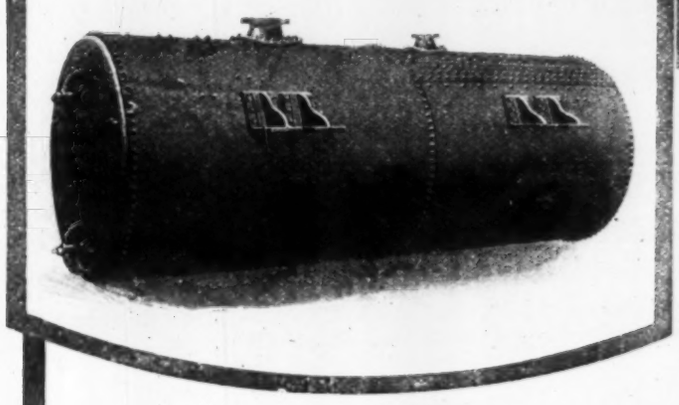

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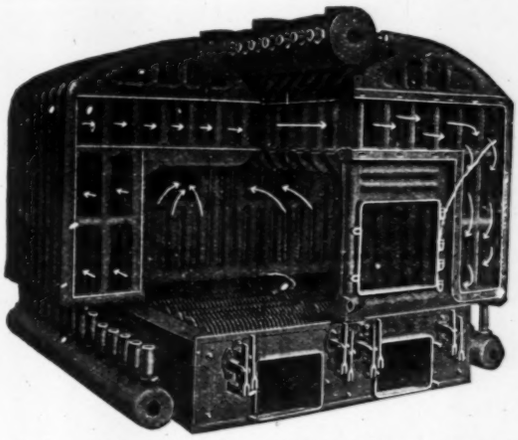

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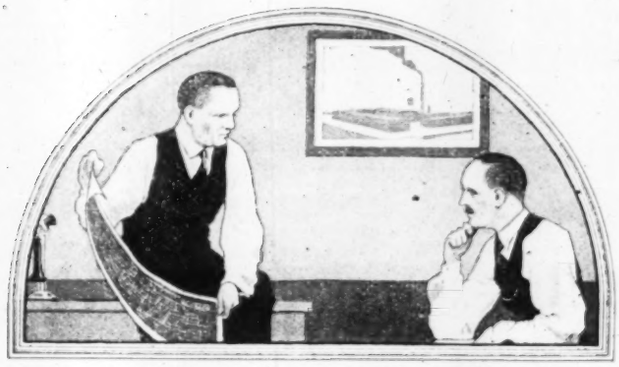

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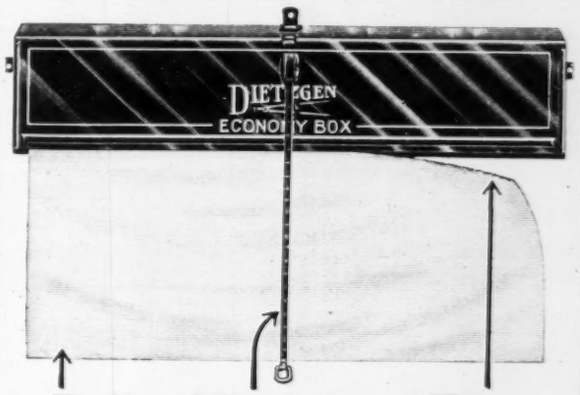

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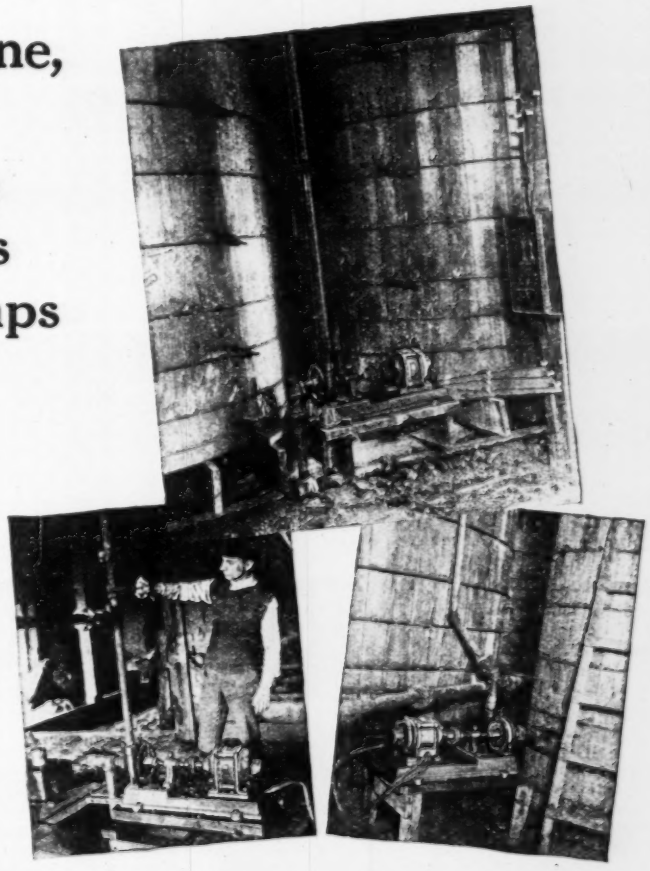
*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1921 Volume*

PUMPS

TRIPLEX · CENTRIFUGAL · ROTARY · DEEP WELL HAND

Acids, Barium, Lithophone, Zinc and Water are handled successfully in Collinsville Zinc Works by thirteen Goulds Pumps



Handling acids, barium, zinc and lithophone is a severe test for any pump, but the magnificent service rendered by the Goulds Pumps in the Zinc Works at Collinsville, Ill., is proof of the excellence of Goulds Pumps. There are twelve Goulds Centrifugals and one Deep Well Pump here operating against heads ranging from 10 ft. to 300 ft.—and every pump is very satisfactory. The maintenance costs have been hardly worth mentioning.

All Goulds Pumps are guaranteed to perform satisfactorily the specified work for which they are sold.

For severe pumping service use Goulds Pumps.

Let our engineers assist you on any pumping problem, and if you haven't a complete set of our Bulletins, drop us a line.

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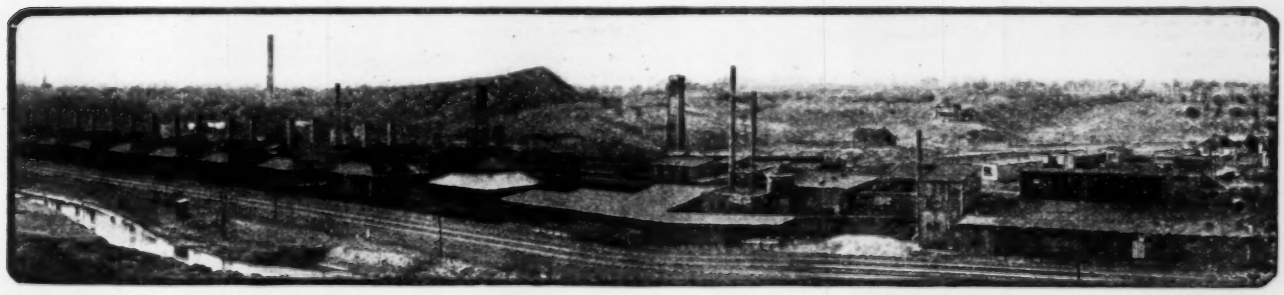

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* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

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Castings, Brass and Bronze
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* Lunkenheimer Co.

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* Doehler Die-Casting Co.
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* Fuller-Lehigh Co.
* Hill Clutch Co.
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* Lunkenheimer Co.
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* United States Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.
* Washburn & Granger (Inc.)

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Castings, Nichrome
Driver-Harris Co.

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* Lunkenheimer Co.
* Vogt, Henry Machine Co.

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Mackintosh-Hemphill Co.

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* Doehler Die-Casting Co.

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* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
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* Fuller-Lehigh Co.
* Hill Clutch Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

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(See Blowers, Pumps, etc., Centrifugal)

Centrifugals, Chemical
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Centrifugals, Metal Drying
* Tolhurst Machine Works

Centrifugals, Sugar
* Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

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* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Machine Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

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(See Stokers, Chain Grate)

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* Reading Chain & Block Corp'n

Chains, Crane
* Reading Chain & Block Corp'n

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Baldwin Chain & Mfg. Co.
* Caldwell, H. W. & Son Co.
* Diamond Chain & Mfg. Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

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Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Steel
(See Stacks, Steel)

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* Niles-Bement-Pond Co.
* Warner & Swasey Co.

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* S K F Industries (Inc.)
* Whitney Mfg. Co.

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* Heald Machine Co.

Chucks, Tapping
* Whitney Mfg. Co.

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* Gifford-Wood Co.

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(See Mills, Cinder)

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* General Electric Co.

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* Schutte & Koerting Co.

Circulators, Steam Heating
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* Yarnall-Waring Co.

Clamps, Wire Rope
(See Wire Rope Fastenings)

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Dietzgen, Eugene Co.
Keuffel & Esser Co.
Kolesch & Co.
New York Blue Print Paper Co.

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* Caldwell, W. E. Co. (Inc.)
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* Gifford-Wood Co.
* Hill Clutch Co.
* Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
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* Brown Hoisting Machinery Co.
* Caldwell, H. W. & Son Co.
* Gifford-Wood Co.
* Illinois Stoker Co.

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* Ingersoll-Rand Co.

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* Gifford-Wood Co.

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* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pratt & Cady Co. (Inc.)

Cocks, Blow-off
* Crane Co.
* Homestead Valve Mfg. Co. (Inc.)
* Lunkenheimer Co.
* Pratt & Cady Co. (Inc.)

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* Crosby Steam Gage & Valve Co.
* Homestead Valve Mfg. Co. (Inc.)
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* Medart Patent Pulley Co.
* Royersford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

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* Sarco Co. (Inc.)
* Uehling Instrument Co.

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Unisol Mfg. Co.

Compounds, Case-Hardening
Kasenit Co.

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* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
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* Pangborn Corporation
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* Union Steam Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air Centrifugal
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* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
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* Worthington Pump & Machinery Corp'n

Compressors, Gas
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* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

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* Vilter Mfg. Co.

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* Ingersoll-Rand Co.
* United States Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
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Elliott Co.
* Schutte & Koerting Co.
* Union Steam Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
* Braun, C. F. & Co.
Elliott Co.
* Union Steam Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

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(See Regulators)

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* General Electric Co.

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* General Electric Co.

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Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

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* Worthington Pump & Machy. Corp'n

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* Roebling's, John A. Sons Co.

Copper Work
* Badger, E. B. & Sons Co.

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(See Engines, Steam, Corliss)

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* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
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Veeder Mfg. Co.

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* Wood's, T. B. & Sons Co.

Counters
Veeder Mfg. Co.

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* Crane Co.
* Lunkenheimer Co.

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* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Caldwell, W. E. Co. (Inc.)
* Fawcus Machine Co.
* Jones, W. A. Foundry & Machine Co.
* Medart Patent Pulley Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
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* Caldwell, H. W. & Son Co.
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* General Electric Co.
* Hill Clutch Co.
* Jones, W. A. Foundry & Machine Co.
* Medart Patent Pulley Co.
* Royersford Foundry & Machine Co.
Smith & Serrell
* Wood's T. B. Sons Co.

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(See Unions)

Couplings, Universal Joint
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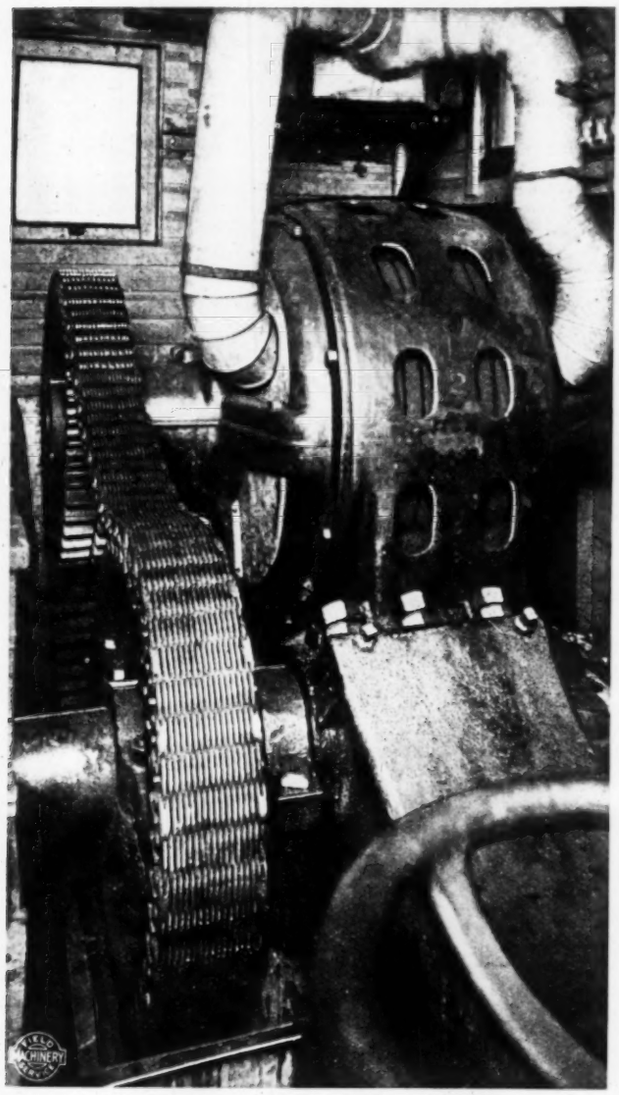
MORSE SILENT CHAIN DRIVES

THE MORSE "ROCKER JOINT"



This 125 H. P. MORSE CHAIN Drives 20 Dry Dock Plunger Pumps

Photo and data come from a well-known Eastern shipyard. The twenty pumps are located on a 1200 ton dry-dock and connected to the 125 H. P. motor through Morse Drives. This installation has been in operation for over a year and the man in charge of it says "it's a very good chain and has saved us a lot of trouble."

Our inspector in making his last report recently said he found the chain practically as good as new.

Morse chains transmit 99% of power, are silent, durable and economical to maintain. They have eliminated driving troubles for many well-known concerns and our engineers will tell you exactly what they will do for you.

Let us tell you more about them

MORSE CHAIN CO., LARGEST MANUFACTURERS OF SILENT CHAINS IN THE WORLD **ITHACA, N. Y.**

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Clyde Iron Works Sales Co.
Curtis Pneumatic Mchy. Co.
* Niles-Bement-Pond Co.
* Northern Engineering Works

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* Brown Hoisting Machinery Co.
Curtis Pneumatic Mchy. Co.
* Niles-Bement-Pond Co.
* Northern Engineering Works
* Pawling & Harnischfeger Co.

Cranes, Locomotive
* Brown Hoisting Machinery Co.
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Cranes, Pillar
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* Northern Engineering Works

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* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.

Cranes, Pneumatic
Curtis Pneumatic Mchy. Co.

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* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Roll
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* Worthington Pump & Machinery Corp'n

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* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

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* Niles-Bement-Pond Co.

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(See Regulators, Damper)

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* Carrier Engineering Corp'n

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(See Castings, Die Moulded)

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Dies, Punching
* Bliss, E. W. Co.

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* Landis Machine Co. (Inc.)
* Pratt & Whitney Co.

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* Landis Machine Co. (Inc.)

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* Engineer Co.

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Keuffel & Esser Co.
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Keuffel & Esser Co.
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* Pawling & Harnischfeger Co.

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* Pratt & Whitney Co.
* Royersford Fdry. & Mach. Co.

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* Niles-Bement-Pond Co.
* Royersford Fdry. & Mch. Co.

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* General Electric Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

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(See Forgings, Hammers, etc., Drop)

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.

Dryers, Sand
* Pangborn Corporation

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* Carrier Engineering Corp'n
* Philadelphia Drying Machinery Co.

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* Sedgwick Machine Works

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* Pangborn Corporation

Dust Collecting Systems
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* Allis-Chalmers Mfg. Co.
Hoevel Mfg. Corp'n

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* Allis-Chalmers Mfg. Co.
Cleveland Blow Pipe & Mfg Co.
* Panghorn Corporation

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* Philadelphia Drying Machinery Co.

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(See Balancing Machines, Dynamic)

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* Wheeler, C. H. Mfg. Co.

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Ejectors
* Lunkenheimer Co.
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* Schutte & Koerting Co.

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(See Generators, Hoists, Trucks, Welding, etc., Electric)

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* General Electric Co.

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(See Instruments, Electrical Measuring)

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* Gifford-Wood Co.
* Hill Clutch Co.
* Jones, W. A. Fdry. & Mach. Co.

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* Northern Engineering Works
* Washburn & Granger (Inc.)

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* Sedgwick Machine Works
* Washburn & Granger (Inc.)

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Eastern Machinery Co.
* Northern Engineering Works
* Washburn & Granger (Inc.)

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Golden-Anderson Valve Specialty Co.
* Schutte & Koerting Co.

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(See Professional Engineering Service Section)

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* Allis-Chalmers Mfg Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Engines, Distillate
Western Machinery Co.

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Titusville Iron Works Co.
Western Machinery Co.

Engines, Gasoline
* Titusville Iron Works Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
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Clyde Iron Works Sales Co.
Flory, S. Mfg. Co.
* Lidgerwood Mfg. Co.
* Morris Machine Works
Western Machinery Co.

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Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Johnson, Carlyle Machine Co.
* Ward, Chas. Engineering Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil
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* De La Vergne Machine Co.
* Titusville Iron Works Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Engines, Steam
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* Brownell Co.
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* Cole, R. D. Mfg. Co.
* Erie City Iron Works
* Leffel, James & Co.
* Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Titusville Iron Works Co.
* Troy Engine & Machine Works
* Vilter Mfg. Co.
* Wheeler, C. H. Mfg. Co.

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* Brownell Co.
* Erie City Iron Works
* Leffel, James & Co.
* Troy Engine & Machine Works

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
Mackintosh-Hemphill Co.
* Vilter Mfg. Co.

Engines, Steam, High Speed
* American Blower Co.
* Brownell Co.
* Erie City Iron Works

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Vilter Mfg. Co.

Engines, Steam, Throttling
* Brownell Co.

Engines, Steam, Variable Speed
* Brownell Co.

Engines, Steering
* Lidgerwood Mfg. Co.

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* Braun, C. F. & Co.

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Flory, S. Mfg. Co.
* Lidgerwood Mfg. Co.
* Pawling & Harnischfeger Co.
Sauerman Bros.

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* American Blower Co.
* Pangborn Corporation

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* Green Fuel Economizer Co.
* Schutte & Koerting Co.

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(See Joints, Expansion)

Extractors, Centrifugal
* Tolhurst Machine Works

Extractors, Oil and Grease
* Braun, C. F. & Co.
* Kieley & Mueller (Inc.)

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* American Blower Co.
Cleveland Blow Pipe & Mfg. Co.
* General Electric Co.
* Green Fuel Economizer Co.
Mechanical Appliance Co.
* Pangborn Corporation
* Philadelphia Drying Machinery Co.

Feed Water Circulators, Heaters, Heaters and Purifiers, etc.
(See Circulators, Heaters, Heaters and Purifiers, etc., Feed Water)

Feed Water Controllers
(See Regulators, Feed Water)

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Fibre, Vulcanized
* Continental Fibre Co.

Filters, Gravity
* Permutit Co.

Filters, Oil
Elliott Co.
* General Electric Co.
* Richardson-Phenix Co.

Filters, Pressure
* Permutit Co.

Filters, Water
* Braun, C. F. & Co.
Elliott Co.
* H. S. B. W.-Cochrane Corp'n
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

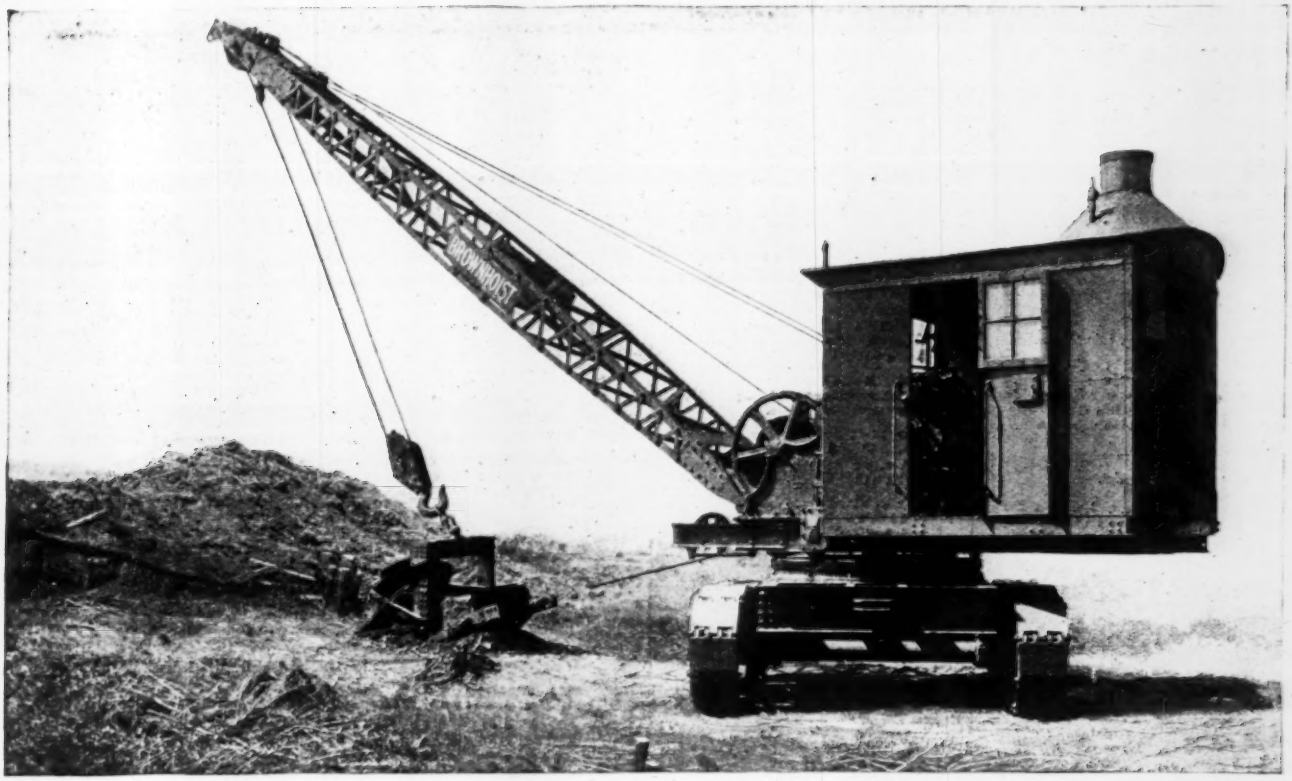
Filtration Plants
* H. S. B. W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fire Tube Boilers
(See Boilers, Return and Vertical Tubular)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Richardson-Phenix Co.



Brownhoist No. 2 Locomotive Crane on Creeper Trucks with Brownhoist Dragline Bucket

Brownhoist method is 50% cheaper

That is what the Long Island Railroad, Jamaica, Long Island, say about their Brownhoist Locomotive Crane. Their first crane was purchased in 1910. Since that time so many new jobs have been found on which a Brownhoist saves money that they are now operating four cranes.

These cranes are used mostly on construction work along the right of way. As on many other jobs, their chief economy lies in the fact that they are self-propelling units which can travel anywhere with a load. Brownhoist cranes are built with creeper trucks, traction wheels or railroad trucks. They operate by steam, electricity or gas engine.

The fact that companies similar to your own are saving money with Brownhoists makes us feel sure that you could do the same. May we send you a copy of our catalog K? It shows how many companies are cutting costs.

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Other Products—Buckets, Electric Hoists, Overhead Cranes, Bridge Cranes, Heavy Dock Machinery, Bins.

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* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Valve & Fittings Co.
* United States Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
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* Hydraulic Press Mfg. Co.
* Reading Valve & Fittings Co.
* Vogt, Henry Machine Co.

Fittings, Pipe
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* Central Foundry Co.
* Crane Co.
* Dougherty, M. J. Co.
* Lunkenheimer Co.
* Reading Valve & Fittings Co.
Steere Engineering Co.
* Vogt, Henry Machine Co.

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* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Valve & Fittings Co.
Steere Engineering Co.
* Vogt, Henry Machine Co.

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* Crane Co.
* Lunkenheimer Co.
* Reading Valve & Fittings Co.
* Vogt, Henry Machine Co.

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* Jones, W. A. Fdry. & Mach. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pratt & Cady Co. (Inc.)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

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* Allis-Chalmers Mfg. Co.

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* Medart Patent Pulley Co.
* Wood's, T. B. Sons Co.

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Forges, Oil
* Rockwell, W. S. Co.

Forges, Rivet
* Rockwell, W. S. Co.

Forgings, Alloy Steel
* American Forge & Machine Co.

Forgings, Drop
* American Forge & Machine Co.
* Vogt, Henry Machine Co.

Forgings, Heavy
* American Forge & Machine Co.

Forgings, Iron and Steel
* American Forge & Machine Co.

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* Hydraulic Press Mfg. Co.

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* Northern Engineering Works

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(See Clutches, Hoists, etc., Friction)

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Rockwood Mfg. Co.

Frictions, Paper and Iron
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(See Economizers, Fuel)

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Furnace Engineering Co.

Furnace, Down Draft
* O'Brien, John Boiler Works Co

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(See Linings, Furnace)

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* General Electric Co.
* Rockwell, W. S. Co.

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* American Engineering Co.
American Spiral Pipe Wks.
* Babcock & Wilcox Co.
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Combustion Engineering Corp'n
Green Engineering Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co.
Roach Stoker Co.
* Washburn & Granger (Inc.)

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Furnaces, Gas
* Rockwell, W. S. Co.

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* General Electric Co.
* Rockwell, W. S. Co.

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* General Electric Co.
* Rockwell, W. S. Co.

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* Rockwell, W. S. Co.

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* Rockwell, W. S. Co.

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* Babcock & Wilcox Co.
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Green Engineering Co.
Herbert Boiler Co.
* Illinois Stoker Co.
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* Johns-Manville (Inc.)

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* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.

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* Crosby Steam Gage & Valve Co.
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Gages, Differential Pressure
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* Foxboro Co. (Inc.)
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co.
* Uehling Instrument Co.

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* Bacharach Industrial Instrument Co.
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* Bailey Meter Co.
* Bristol Co.
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* Foxboro Co. (Inc.)
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co.
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* Bacharach Industrial Instrument Co
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* Bristol Co.
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* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co.
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* Precision Instrument Co.

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* Moore Steam Turbine Corp'n

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* Cleveland Worm & Gear Co.
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* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
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* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.

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* De Laval Steam Turbine Co
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* De Laval Steam Turbine Co
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* Ford Regulator Corp'n
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* Vogt, Henry Machine Co.
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Grates, Shaking
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* Casey-Hedges Co.
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Roach Stoker Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Washburn & Granger (Inc.)

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(See Oil and Grease Cups)

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(See Separators, Oil)

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Texas Co.

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* Niles-Bement-Pond Co.
* Smidth, F. L. & Co.

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* Landis Machine Co. (Inc.)
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Grinding Machines, Dsc
* Niles-Bement-Pond Co.

Grinding Machines, Floor
* Royersford Foundry & Machine Co.

Grinding Machines, Internal
* Heald Machine Co.

Grinding Machines, Surface
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* Pratt & Whitney Co.

Grinding Machines, Tool
Le Blond, R. K. Mach. Tool Co.
* Niles-Bement-Pond Co.

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* American Metal Treatment Co.

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Hammers, Pneumatic
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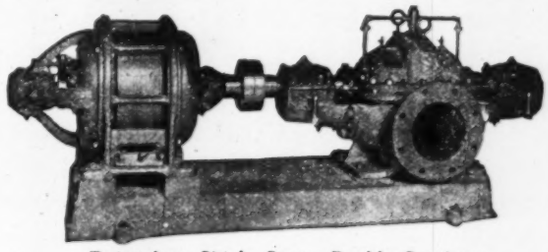

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1750 R.P.M. 83% efficiency

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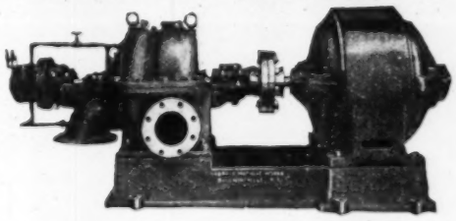

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Hammers, Steam
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* Erie City Iron Works
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* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

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* Northern Engineering Works
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* Washburn & Granger (Inc.)

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* Lidgerwood Mfg. Co.

Hoists, Chain
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* Reading Chain & Block Corp'n
* Yale & Towne Mfg. Co.

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* Reading Chain & Block Corp'n
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* Lidgerwood Mfg. Co.
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Smith, S. Morgan Co.

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* Lidgerwood Mfg. Co.
Western Machinery Co.

Hoists, Skip
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Flory, S. Mfg. Co.
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(See Engines, Hoisting)

Hoists, Telescopic Ash
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* Carrier Engineering Corp'n

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* Worthington Pump & Machinery Corp'n

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Mackintosh-Hemphill Co.
* Niles-Bement-Pond Co.
* Worthington Pump & Machinery Corp'n

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(See Rams, Presses, Turbines, etc., Hydraulic)

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* Richardson-Phenix Co.

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* Bristol Co.
* Crosby Steam Gage & Valve Co.
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* Niles-Bement-Pond Co.
* Pratt & Whitney Co.
* Warner & Swasey Co.

Leather Belting, Packing, etc.
(See Belting, Packing, etc., Leather)

Levers, Flexible (Wire)
* Gwilliam Co.

Lightning Arresters
* General Electric Co.

Lining, Brake
* Johns-Manville (Inc.)

Lining, Furnace
* Best, W. N. Furnace & Burner Corp'n
Brinckerhoff, H. Gordon Co.
* Celite Products Co.
* Crescent Refractories Co.
* Johns-Manville (Inc.)
* Washburn & Granger (Inc.)

Lining, Stack
* Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n

Loaders, Wagon
* Gifford-Wood Co.

Lockers, Metal
Lyon Metallic Mfg. Co.

Locomotives, Electric
* General Electric Co.

Locomotives, Storage Battery
* General Electric Co.

Logging Machinery
Clyde Iron Works Sales Co.
* Lidgerwood Mfg. Co.

Lubricants
* Royersford Fdry. & Mach. Co.
Texas Co.

Lubricating Systems
* Greene, Tweed & Co.
* Richardson-Phenix Co.

Lubricators, Cylinder
* Greene, Tweed & Co.
* Lunkenheimer Co.
* Richardson-Phenix Co.

Lubricators, Force-Feed
* Greene, Tweed & Co.
* Lunkenheimer Co.
* Richardson-Phenix Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.

Machine Work
Bay View Foundry Co.
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Hill Clutch Co.
* Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
* Lammert & Mann Co.
* Washburn & Granger (Inc.)

Machinery
(Is classified under the headings descriptive of character thereof)

Magnesia Products
* Magnesia Assoc. of America

Manometers
* Bacharach Industrial Instrument Co.
* Republic Flow Meters Co.

Mechanical Draft Apparatus
* American Blower Co.
* Green Fuel Economizer Co.
Power Turbo-Blower Co.

Mechanical Stokers
(See Stokers)

Metal Cutting Machines
(See Cutting-off Machines, Metal)

Metal Reclaiming Mills
(See Mills, Metal Reclaiming)

Metal Treating
* American Metal Treatment Co.
* Rockwell, W. S. Co.

Metals, Bearing
* General Electric Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Foxboro Co. (Inc.)
* General Electric Co.
* Republic Flow Meters Co.

Meters, Boiler Performance
* Bailey Meter Co.

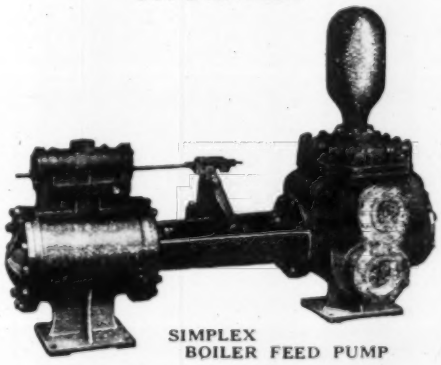
Meters, Electric
* General Electric Co.

Meters, Feed Water
* Bailey Meter Co.
* Foxboro Co. (Inc.)
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Precision Instrument Co.
* Republic Flow Meters Co.
* Worthington Pump & Machinery Corp'n
* Yarnall-Waring Co.

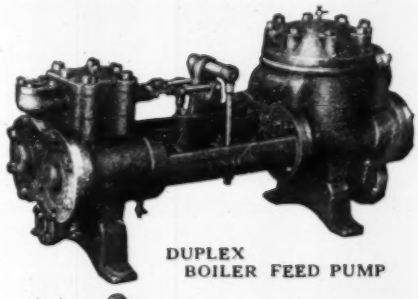
Meters, Flow
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* Republic Flow Meters Co.
* Spray Engineering Co.

UNION

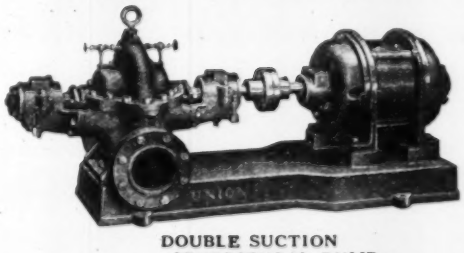
SIMPLEX—**PUMPS**—DUPLEX
STEAM-POWER-CENTRIFUGAL
AIR COMPRESSORS
CONDENSERS



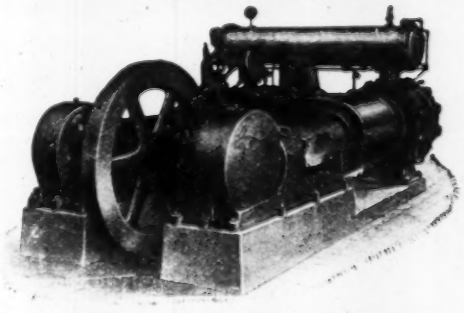
SIMPLEX
BOILER FEED PUMP



DUPLEX
BOILER FEED PUMP



DOUBLE SUCTION
CENTRIFUGAL PUMP



CROSS COMPOUND TWO STAGE
AIR COMPRESSOR

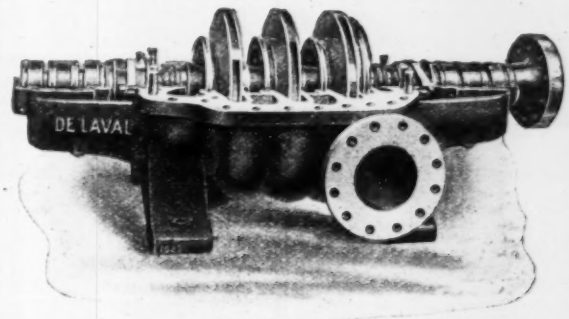
OUR BULLETINS PRINTED FOR YOUR BENEFIT

UNION STEAM PUMP CO.

BATTLE CREEK
MICH.
U. S. A.

OFFICES AND AGENTS EVERYWHERE

See Our Data in 1921 A.S.M.E Condensed Catalogues of Mechanical Equipment



De Laval multi-stage pump with casing cover removed.

Centrifugal Pump Perfection

LIKE perfection in any of the many difficult arts which look easy to the outsider, perfection in the building of centrifugal pumps is compounded of an accumulation of exact knowledge and long and extended experience.

The unequalled efficiencies obtained by De Laval centrifugal pumps (one recently showed over 86% under official test) have been attained only through consistent experimenting and testing. De Laval centrifugal pumps are carefully tested as to capacity, efficiency and running qualities, and it is thus possible for our Engineering Department to note the effects of every change in design.

High efficiency is further effected by the use of De Laval labyrinth wearing rings, which reduce to a minimum the leakage from the discharge to the suction chamber.

Every De Laval centrifugal pump is fully guaranteed. If you will state the proposed conditions of operation, our engineers will promptly give you the benefit of suggestions based upon an extensive experience, and will quote results which we are prepared to guarantee.

Ask for our new
Centrifugal Pump Catalog B58

DE LAVAL STEAM TURBINE CO.

Trenton, N. J.

DE LAVAL STEAM TURBINE CO. TRENTON, N.J.

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CLASSIFIED LIST OF MECHANICAL EQUIPMENT (Continued) FOR ALPHABETICAL INDEX, SEE PAGE 112

Meters, Oil
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Plant Engrg. & Equip. Co. (Inc.)
* Richardson-Phenix Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Lockett, A. M. & Co. (Ltd.)
* Republic Flow Meters Co.

Meters, Steam
* Bailey Meter Co.
* Foxboro Co. (Inc.)
* General Electric Co.
* Republic Flow Meters Co.

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Yarnall-Waring Co.

Meters, Venturi
* National Meter Co.
* Republic Flow Meters Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* National Meter Co.
Plant Engrg. & Equip. Co. (Inc.)
* Worthington Pump & Machinery Corp'n
* Yarnall-Waring Co.

Micrometers
* Starrett, L. S. Co.

Milling Attachments
LeBlond, R. K. Mach. Tool Co.

Milling Machines
* Niles-Bement-Pond Co.
* Pawling & Harnischfeger Co.

Milling Machines, Automatic
Bilton Machine Tool Co.
* Pratt & Whitney Co.

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
Bilton Machine Tool Co.
LeBlond, R. K. Mach. Tool Co.
* Warner & Swasey Co.

Milling Machines, Universal
LeBlond, R. K. Mach. Tool Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motion Recorders
* Foxboro Co. (Inc.)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co

Motors, Electric
* General Electric Co.
Mechanical Appliance Co.

Mufflers
Maxim Silencer Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Non-Return Valves
(See Valves, Non-Return)

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Badger, E. B. & Sons Co.
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.
* Yarnall-Waring Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.

Oil and Grease Cups
* Crane Co.
* Lunkenheimer Co.
* Richardson-Phenix Co.

Oil and Grease Guns
* Royersford Foundry & Machine Co.

Oil Burners, Engines, Filters, Pumps, Separators, etc.
(See Burners, Engines, Filters, Pumps, Separators, etc., Oil)

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
* Lockett, A. M. & Co. (Ltd.)
* Maxon Furnace & Engrg. Co.
* Rockwell, W. S. Co.
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Richardson-Phenix Co.

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Richardson-Phenix Co.

Oil Tanks
* Scaife, Wm. B. & Sons Co.

Oil Well Machinery
* Brownell Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Oilers, Sight Feed
* Lunkenheimer Co.

Oiling Devices
* Lunkenheimer Co.
* Richardson-Phenix Co.

Oiling Systems
* Lunkenheimer Co.
* Richardson-Phenix Co.

Oils, Fuel
Texas Co.

Oils, Lubricating
Texas Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.

Overhead Track Systems
(See Tramrail Systems, Overhead)

Oxy-Acetylene Supplies
Linde Air Products Co

Oxygen Gas
* Linde Air Products Co.

Packing, Ammonia
* France Packing Co.

Packing, Asbestos
* Johns-Manville (Inc.)

Packing, Hydraulic
* France Packing Co.
* Greene, Tweed & Co.
* Johns-Manville, (Inc.)

Packing, Metallic
* France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville (Inc.)

Packing, Rod (Piston and Valve)
* France Packing Co.
* Greene, Tweed & Co.
* Jenkins Bros.
* Johns-Manville (Inc.)

Packing, Rubber
* Jenkins Bros.
* Johns-Manville (Inc.)

Packing, Sheet
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)

Paint, Metal
* General Electric Co.
* Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.
Kolesch & Co.
New York Blue Print Paper Co.

Paper, Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.
Kolesch & Co.
New York Blue Print Paper Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
* Washburn & Granger (Inc.)

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
Kolesch & Co.

Penstocks
Smith, S. Morgan Co.

Perforated Metals
(See Metals, Perforated)

Petroleum Products
Texas Co.

Photostats
Photostat Corporation

Pile Drivers
Clyde Iron Works Sales Co.
* Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* Caldwell, W. E. Co. (Inc.)
* General Electric Co.

Pipe Bending Machines
* Hydraulic Press Mfg. Co.

Pipe, Cast Iron
* Central Foundry Co.
* United States Cast Iron Pipe & Fdry. Co.

Pipe, Riveted
American Spiral Pipe Wks.
Steere Engineering Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Pipe, Riveted Steel
* Springfield Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.
Steere Engineering Co.

Pipe, Welded
American Spiral Pipe Wks.
* Crane Co.
Steere Engineering Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting and Threading Machines
* Crane Co.
* Landis Machine Co. (Inc.)

Pipe Joint Clamps
(See Clamps, Pipe Joint)

Piping, Power
* Crane Co.
* Dougherty, M. J. Co.
Mitchell, W. K. & Co. (Inc.)
Steere Engineering Co.

Piston Rings
* Ever-Tyte Piston Ring Division (Walter A. Zelnicker Supply Co.)

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
* Foxboro Co. (Inc.)

Plate Metal Work
(See Steel Plate Construction)

Pneumatic Tools, Tubes, etc.
(See Tools, Tubes, etc., Pneumatic)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Royersford Foundry & Machine Co.

Poppet Valve Engines
(See Engines, Steam, Poppet Valve)

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Caldwell, W. E. Co. (Inc.)
Eastern Machinery Co
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hill Clutch Co.
* Jones, W. A. Fdry. & Mch. Co.
* Medart Patent Pulley Co.
* Morse Chain Co.
* Royersford Foundry & Machine Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Wood's, T. B. Sons Co

Presses, Baling
* Philadelphia Drying Machinery Co.
* Hydraulic Press Mfg. Co.

Presses, Blanking
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.

Presses, Draw
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.

Presses, Embossing
* Hydraulic Press Mfg. Co.

Presses, Extruding
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.

Presses, Foot
* Bliss, E. W. Co.
* Royersford Foundry & Machine Co.

Presses, Forging
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.

Presses, Forming
* Hydraulic Press Mfg. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co
* Hydraulic Press Mfg. Co.
Mackintosh-Hemphill Co.
* Philadelphia Drying Machinery Co.

Presses, Power
* Niles-Bement-Pond Co.

Presses, Punching and Trimming
* Bliss, E. W. Co.
* Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Presses, Sheet Metal Working
* Bliss, E. W. Co.

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
* Worthington Pump & Mchy. Corp'n

Profiling Machines
* Pratt & Whitney Co.

Propellers
* Morris Machine Works

Pulleys, Iron
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Caldwell, W. E. Co. (Inc.)
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Hill Clutch Co.
* Jones, W. A. Fdry. & Mch. Co.
* Medart Patent Pulley Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Caldwell, H. W. & Son Co.
* Medart Patent Pulley Co.

Pulleys, Wood
* Caldwell, H. W. Son Co.
* Medart Patent Pulley Co.

Pulverized Fuel Feeders
(See Feeders, Pulverized Fuel)

Pulverizers
* Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc., Pumps)

Pumping Engines
(See Engines, Pumping)

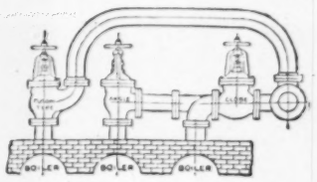
4100 In The Steel Plants

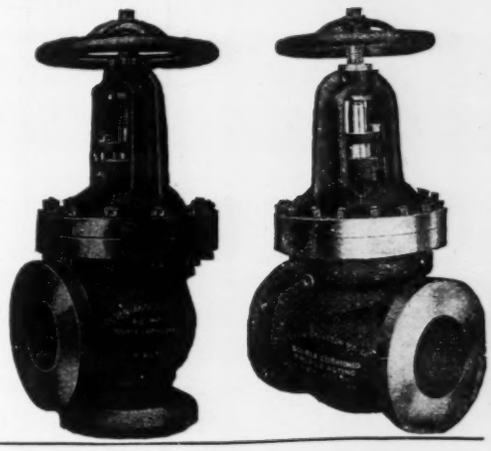
The safety of the men and the hundreds of millions of dollars invested in the plant equipment of the steel industries make their protection an imperative need.

With this requirement in view, the engineers, after a most rigid investigation and competitive performance tests, installed 4100.

GOLDEN-ANDERSON
Life and Property Insurance Valve

Charles E. Golden
President and General Manager





These patent automatic double-cushioned triple-acting and non-return valves have made good in thousands of plants.

They are as vital to safety from back flow or the sudden release of high pressure steam as pop safety valves are to give protection from dangerous over-pressure.

They will cut off a boiler instantly when a tube ruptures.

They prevent live steam from entering a cold boiler.

Automatically cut in and cut out boilers until the pressure between all boilers is equalized.

Automatically cut off steam flow from every boiler—the instant that a steam pipe bursts.

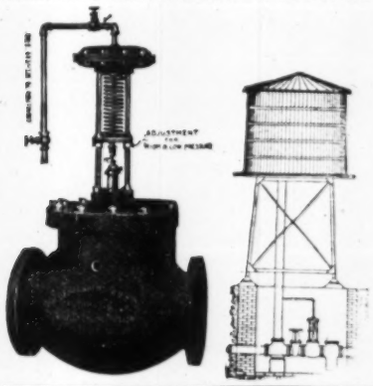
Will not chatter, pound or spin.

The only valve that can be tested in service.

DOUBLE EXTRA HEAVY VALVES

Stop Water Waste

down overflows of reservoirs, standpipes, tanks, etc., by automatically maintaining the water level constant at the desired level with



Golden-Anderson Pat.

Cushioned Automatic Altitude Controlling Valves

They operate without floats or fixtures.

Three ways of closing:

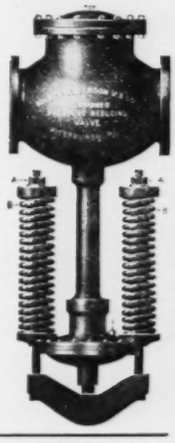
1. By water.
2. By electricity from distant points.
3. By hand.

Sizes to 24 in.

Virtually Indestructible

GOLDEN-ANDERSON

Patent Cushioned Automatic Steam Pressure Regulating Valves



Safe Operating Pistons make it impossible for high pressure to enter into low pressure service. Makes accidents impossible.

Thoroughly cushioned—no hammering, chattering or sticking.

No auxiliary valves or small by-pass—reliable and uninterrupted service.

Double extra heavy throughout—practically indestructible.

Only one adjustment—on the outside. Valve always accessible.

Angle and Globe Patterns

GOLDEN-ANDERSON

Cushioned Water Relief Valves

Automatically relieve excess water pressure in mains.

Prevent bursting and dangerous piping stress.

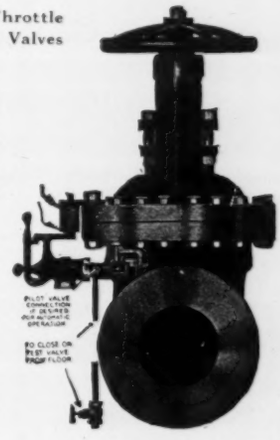
No metal to metal seating. Perfectly cushioned by water and air.

Prevent shock and water hammer.

Double extra strong and proof against corrosion.

GOLDEN-ANDERSON

Patent Cushioned Combined Throttle and Automatic Engine Stop Valves



Safeguard against run-away engines or accidents to men and machinery.

Can be tripped instantly from distant points by electricity on open or closed circuit.

Double Extra Heavy Construction.

Double Corliss Dash Pot Cushion.

Adapted for all working pressure.

The only valves that can be opened by electricity from distant points.

Golden-Anderson Valve Specialty Company 1228 Fulton Building PITTSBURGH, PA.

CLASSIFIED LIST OF MECHANICAL EQUIPMENT (Continued) FOR ALPHABETICAL INDEX, SEE PAGE 112

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
* Titusville Iron Works Co.

Pumps, Air
* Goulds Mfg. Co.
Plant Engrg. & Equip. Co. (Inc.)

Pumps, Ammonia
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
* Dayton Dowd Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Kerr Turbine Co.
Plant Engrg. & Equip. Co. (Inc.)
Twinvolute Pump & Mfg. Co.
* Union Steam Pump Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
* Braun, C. F. & Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Dayton-Dowd Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Kerr Turbine Co.
* Lammert & Mann Co.
* Morris Machine Works
Plant Engrg. & Equip. Co. (Inc.)
* Taber Pump Co.
Twinvolute Pump & Mfg. Co.
* Union Steam Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Plant Engrg. & Equip. Co. (Inc.)

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Dredging
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Dry Vacuum
(See Pumps, Vacuum)

Pumps, Electric
* Allis-Chalmers Mfg. Co.
* Dayton-Dowd Co.
* Goulds Mfg. Co.
* Morris Machine Works
Plant Engrg. & Equip. Co. (Inc.)
Twinvolute Pump & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
* Dayton-Dowd Co.
Twinvolute Pump & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Filter Press
* Hydraulic Press Mfg. Co.

Pumps, Fire
* Dayton-Dowd Co.

Pumps, Hand
* Goulds Mfg. Co.

Pumps, Hydraulic
* Union Steam Pump Co.

Pumps, Hydraulic Pressure
* Dayton-Dowd Co.
* Goulds Mfg. Co.
* Hydraulic Press Mfg. Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring (Gasoline or Oil)
* Richardson-Phenix Co.

Pumps, Oil
* Goulds Mfg. Co.
* Lunkenheimer Co.
* Maxon Furnace & Engrg. Co.
Plant Engrg. & Equip. Co. (Inc.)
* Richardson-Phenix Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Greene, Tweed & Co.
* Lunkenheimer Co.
* Richardson-Phenix Co.

Pumps, Oil (Hand)
* Richardson-Phenix Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Union Steam Pump Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
* Lammert & Mann Co.
* Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
* Braun, C. F. & Co.
Buffalo Steam Pump Co.
Plant Engrg. & Equip. Co. (Inc.)
* Union Steam Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
* Dayton-Dowd Co.
* Union Steam Pump Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
* Dayton-Dowd Co.
* Goulds Mfg. Co.
* Morris Machine Works
* Smidth, F. L. & Co.

Pumps, Tank
* Goulds Mfg. Co.
Twinvolute Pump & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
* Braun, C. F. & Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Morris Machine Works
Plant Engrg. & Equip. Co (Inc.)
Power Turbo-Blower Co.
Twinvolute Pump & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lammert & Mann Co.
Plant Engrg. & Equip. Co. (Inc.)
* Union Steam Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Punches, Multiple
* Bliss, E. W. Co.
* Long & Allstatter Co.
Mackintosh-Hemphill Co.
* Niles-Bement-Pond Co.

Punches, Power
* Bliss, E. W. Co.
* Royersford Fdry. & Mch. Co.

Punches and Dies
* Bliss, E. W. Co.
* Pratt & Whitney Co.
* Royersford Fdry. & Mch. Co.

Punching and Coping Machines
* Long & Allstatter Co.

Punching and Shearing Machines
* Bliss, E. W. Co.
* Long & Allstatter Co.
* Niles-Bement-Pond Co.
* Royersford Fdry. & Mch. Co.

Purifiers, Oil
Elliott Co.
* Richardson-Phenix Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.
* Yarnall-Waring Co.

Pyrometers, Electric
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.
* Superheater Co.

Pyrometers, Pneumatic
* Uehling Instrument Co.

Racks, Cut
* Brownell Co.
* James, D. O. Mfg. Co.

Radiators, Steam and Water
* Smith, H. B. Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Reamers, Adjustable & Expansion
Rogers, John M. Works (Inc.)

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* Crescent Refractories Co.
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Refuse Destructors
(See Destructors, Refuse)

Regulators, Blower
Davis, G. M. Regulator Co.

Regulators, Damper
Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
Plant Engrg. & Equip. Co. (Inc.)
Power Turbo-Blower Co

Regulators, Electric
* General Electric Co.

Regulators, Feed Water
Elliott Co.
* Kieley & Mueller (Inc.)
Plant Engrg. & Equip. Co. (Inc.)

Regulators, Flow (Steam)
Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Pressure
Davis, G. M. Regulator Co.
* Ford Regulator Corp'n
* General Electric Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Plant Engrg. & Equip. Co. (Inc.)

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Foxboro Co. (Inc.)
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)

Regulators, Time
* Foxboro Co. (Inc.)

Regulators, Water Level
* Ford Regulator Corp'n

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
Bilton Machine Tool Co.
* Long & Allstatter Co.

Rivets
* Reed & Prince Mfg. Co.

Rods, Fibre
* Continental Fibre Co.

Roller Bearings
(See Bearings, Roller)

Rolling Mill Machinery
Mackintosh-Hemphill Co.

Rolls, Crushing
* Worthington Pump & Machinery Corp'n

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
* Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
* Johns-Manville (Inc.)

Rope Drives
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Falls Clutch & Machinery Co.
* Hill Clutch Co.
* Medart Patent Pulley Co.
* Wood's, T. B. Sons Co.

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
* Caldwell, H. W. & Son Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rubber Goods, Mechanical
* Jenkins Bros.

Safety Guards
Cleveland Blow Pipe & Mfg.

Sand Blast Apparatus
* De La Vergne Machine Co.
Hoevel Mfg. Corp'n
* Lunkenheimer Co.
* Pangborn Corporation

Sand Blast Equipment
Hoevel Mfg. Corp'n
* Pangborn Corporation

Saw Blades, Hack
* Starrett, L. S. Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saws, Circular (Metal)
* Niles-Bement-Pond Co.

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
* Caldwell, H. W. & Son Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
* Caldwell, H. W. & Son Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screw, Steel
* Union Drawn Steel Co.

Screws, Cap & Set
Allen Mfg. Co.
* Reed & Prince Mfg. Co.

Screws, Machine
* Reed & Prince Mfg. Co.

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Wood
* Reed & Prince Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H. S. B. W.-Cochrane Corp'n
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Plant Engrg. & Equip. Co. (Inc.)

Separators, Steam
* Crane Co.
Elliott Co.
* H. S. B. W.-Cochrane Corp'n
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Plant Engrg. & Equip. Co. (Inc.)

Shafting
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Falls Clutch & Mchy. Co.
* Hill Clutch Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Patent Pulley Co.

Shafting, Flexible
* Gwilliam Co.

Shafting, Flexible Metallic
Breeze Metal Hose & Mfg. Co.

Shapers
* Niles-Bement-Pond Co.
* Pratt & Whitney Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Shears, Alligator
* Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Shears, Plate
* Long & Allstatter Co.
Mackintosh-Hemphill Co.
* Niles-Bement-Pond Co.

Shears, Squaring
* Bliss, E. W. Co.
* Niles-Bement-Pond Co.

Sheaves, Rope
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Caldwell, W. E. Co. (Inc.)
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Hill Clutch Co.
* Jones, W. A. Fdry. & Mch. Co.
Mackintosh-Hemphill Co.
* Medart Patent Pulley Co.
* Wood's, T. B. Sons Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1921 Volume*

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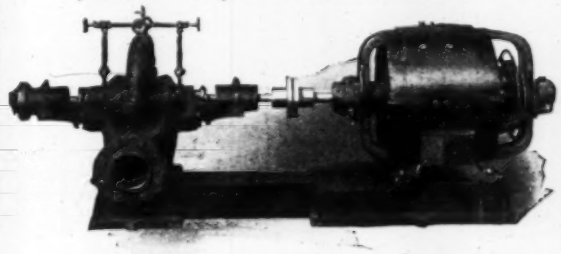
Rotary & Centrifugal

Our Centrifugal Pumps are of the most approved design and construction for handling **water**, or equivalent fluids.

Our Rotary Pumps are used where Centrifugals cannot be applied, namely for handling heavy oils, tar, asphalt, molasses, etc.



We solicit your inquiries and specifications

TABER PUMP CO. Buffalo, N. Y.

See Our Data in 1921 A.S.M.E. Condensed Catalogues of Mechanical Equipment

LAMMERT ROTARY PUMPS DRY VACUUM & PRESSURE

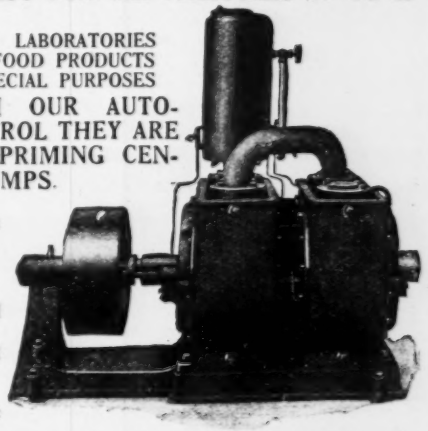
FOR ANY DRY VACUUM SERVICE TO WITHIN $\frac{1}{10}$" OF THE BAROMETER DEPENDING ON TYPE OF PUMP—ALSO FOR AIR PRESSURES UP TO 25 POUNDS.

FOR CHEMICAL LABORATORIES
FOR CANNING FOOD PRODUCTS
AND MANY SPECIAL PURPOSES

USED WITH OUR AUTOMATIC CONTROL THEY ARE IDEAL FOR PRIMING CENTRIFUGAL PUMPS.

TANDEM TYPE FOR HIGHEST VACUUM

BELT OR MOTOR DRIVEN



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LAMMERT & MANN CO.

ENGINEERS 216-20 N. Wood St. MACHINISTS CHICAGO, ILL.

25 YEARS OF SERVICE

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One of the largest collections of engineering literature in the world is that found in the Engineering Societies Library, 29 West 39th Street, New York.

It comprises 150,000 volumes, including many rare and valuable reference works not readily accessible elsewhere. Over 1,300 technical journals and magazines are regularly received, including practically every important engineering journal published in the civil, mechanical, electrical, and mining fields.

The library is open from 9 a. m. to 10 p. m. with trained librarians in constant attendance. Its resources are at the service of the engineering and scientific public.

CLASSIFIED LIST OF MECHANICAL EQUIPMENT (Continued) FOR ALPHABETICAL INDEX, SEE PAGE 112

Sheet Metal Work
* Allington & Curtis Mfg. Co.
Cleveland Blow Pipe & Mfg. Co.

Sheet Metal Working Machinery
* Bliss, E. W. Co.
* Niles-Bement-Pond Co.

Sheets, Fibre
* Continental Fibre Co.

Shelving, Metal
Lyon Metallic Mfg. Co.

Silencers, Exhaust
Maxim Silencer Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Sirens
(See Whistles, Steam)

Slide Rules
Dietzgen, Eugene Co.
Gilson Slide Rule Co.
Keuffel & Esser Co.
Kolesch & Co.

Slitting Machines
Bilton Machine Tool Co.
* Bliss, E. W. Co.
* Niles-Bement-Pond Co.

Slotters, Machine
* Niles-Bement-Pond Co.

Sluice Gates
(See Gates, Sluice)

Smoke Consumers
Monarch Soot Remover Co.(Inc.)

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
* Bayer Steam Soot Blower Co.
Diamond Power Specialty Co.
Monarch Soot Remover Co.(Inc.)

Special Machinery
* Brown, A. & F. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Fawcus Machine Co.
* Lammert & Mann Co.
Mackintosh-Hemphill Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.
* Washburn & Granger (Inc.)

Speed Reducing Transmissions
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.

Spouts, Grain
* Caldwell, H. W. & Son Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Spray Nozzles
(See Nozzles, Spray)

Sprays, Water
* Badger, E. B. & Sons Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Yarnall-Waring Co.

Springs, Coiled
New York Wire & Spring Co.

Springs, Steel
New York Wire & Spring Co.

Springs, Vanadium
New York Wire & Spring Co.

Springs, Wire
New York Wire & Spring Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Caldwell, H. W. & Son Co.
* Caldwell, W. E. Co. (Inc.)
* Fuller-Lehigh Co.
* Gifford-Wood Co.
* Hill Clutch Co.
* Medart Patent Pulley Co.

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Heine Boiler Co.
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
Golden-Anderson Valve Specialty Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Engines, Separators, Superheaters, Traps, Turbines, etc.
(See Engines, Separators, Superheaters, Traps, Turbines, etc., Steam)

Steam Specialties
* Crane Co.
Davis, G. M. Regulator Co.
Golden-Anderson Valve Specialty Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Sarco Co. (Inc.)
* Yarnall-Waring Co.

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.
Ward's, Edgar T. Sons Co.

Steel, Cold Rolled
* Union Drawn Steel Co.
Ward's, Edgar T. Sons Co.

Steel, High Speed
Ward's, Edgar T. Sons Co.

Steel, Magnet
Ward's, Edgar T. Sons Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open hearth
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Tool
Ward's, Edgar T. Sons Co.

Steel, Vanadium
* Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
Burhorn, Edwin Co.
* Caldwell, W. E. Co. (Inc.)
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Heine Boiler Co.
* Hendrick Mfg. Co.
* Keeler, E. Co.
Steere Engineering Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Steering Engines
(See Engines, Steering)

Stocks and Dies
* Landis Machine Co. (Inc.)
* Pratt & Whitney Co.

Stokers, Chain Grate
* Babcock & Wilcox Co.
Combustion Engineering Corp'n
Green Engineering Co.
* Illinois Stoker Co.

Stokers, Hand Operated
* Files Engineering Co.

Stokers, Overfeed
* Murphy Iron Works
Roach Stoker Co.

Stokers, Underfeed
* American Engineering Co.
Combustion Engineering Corp'n
* Riley, Sanford Stoker Co.
Roach Stoker Co.

Strainers, Oil
* Lockett, A. M. & Co. (Ltd.)
Plant Engrg. & Equip. Co. (Inc.)
* Richardson-Phenix Co.

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
* Braun, C. F. & Co.
Elliott Co.
Golden-Anderson Valve Specialty Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
Brinckerhoff, H. Gordon Co.
* Heine Boiler Co.
Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
Power Specialty Co.
* Superheater Co.

Supherheaters, Steam (Marine)
Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.

Switches, Electric
* General Electric Co.

Synchronous Converters
(See Converters, Synchronous)

Tables, Drawing
Dietzgen, Eugene Co
Keuffel & Esser Co.
Kolesch & Co.
New York Blue Print Paper Co.

Tachometers
* Bristol Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.
Veeder Mfg. Co.

Tachoscopes
* Schaeffer & Budenberg Mfg. Co.

Tackle Blocks
(See Blocks, Tackle)

Tank Work (Air, Gas, Oil, Water)
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Heine Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Tanks, Acid
* Caldwell, W. E. Co. (Inc.)
* Walsh & Weidner Boiler Co.

Tanks, Copper
* Badger, E. B. & Sons Co.

Tanks, Oil
* Caldwell, W. E. Co. (Inc.)
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Caldwell, W. E. Co. (Inc.)
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Brownell Co.
* Caldwell, W. E. Co. (Inc.)
* Heine Boiler Co.
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Caldwell, W. E. Co. (Inc.)
* Cole, R. D. Mfg. Co.
Green Engineering Co.
* H. S. B. W.-Cochrane Corp'n
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Walsh and Weidner Boiler Co.

Tanks, Tower
* Caldwell, W. E. Co. (Inc.)
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Tapping Machines
* Pratt & Whitney Co.

Taps and Dies
* Pratt & Whitney Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Thermometers
* Ashton Valve Co.
* Bristol Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.

Thermometers, Distance
* Foxboro Co. (Inc.)

Thermometers, High Range (Recording)
* Bailey Meter Co.

Thermostats
* Bristol Co.
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co. (Inc.)

Time Controllers
(See Regulators, Time)

Time Recorders
* Bristol Co.
* Foxboro Co. (Inc.)

Tools, Boring
Rogers, John M. Works (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Machinist's Small
* Pratt & Whitney Co.
* Starrett, L. S. Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
Rogers, John M. Works (Inc.)

Torches, Hand
* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
* Northern Engineering Works
* Washburn & Granger (Inc.)

Tractors
* Allis-Chalmers Mfg. Co.
* Dayton-Dowd Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
* Northern Engineering Wks.
* Reading Chain & Block Corp'n

Tramways, Wire Rope
Clyde Iron Works Sales Co.
* Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Traps, Air
Plant Engrg. & Equip. Co. (Inc.)

Traps, Radiator
Plant Engrg. & Equip. Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Plant Engrg. & Equip. Co. (Inc.)

Traps, Steam
* American Blower Co.
* Crane Co.
Davis, G. M. Regulator Co.
Elliott Co.
Golden-Anderson Valve Specialty Co.
* Illinois Engineering Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Kieley & Mueller (Inc.)
Plant Engrg. & Equip. Co. (Inc.)
* Pratt & Cady Co. (Inc.)
* Sarco Co. (Inc.)
* Schutte & Koerting Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Illinois Engineering Co.
Plant Engrg. & Equip. Co. (Inc.)
* Sarco Co. (Inc.)

Trolleys
* Brown Hoisting Machinery Co.
Curtis Pneumatic Machinery Co.
* Pawling & Harnischfeger Co.
* Reading Chain & Block Corp'n

Trucks, Industrial (Storage Battery)
* Yale & Towne Mfg. Co.

Tube Cleaners, Boiler
* Johns-Manville (Inc.)
* Yarnall-Waring Co.

Tubes, Pitot
* Bacharach Industrial Instrument Co.

Tubing, Fibre
* Continental Fibre Co.

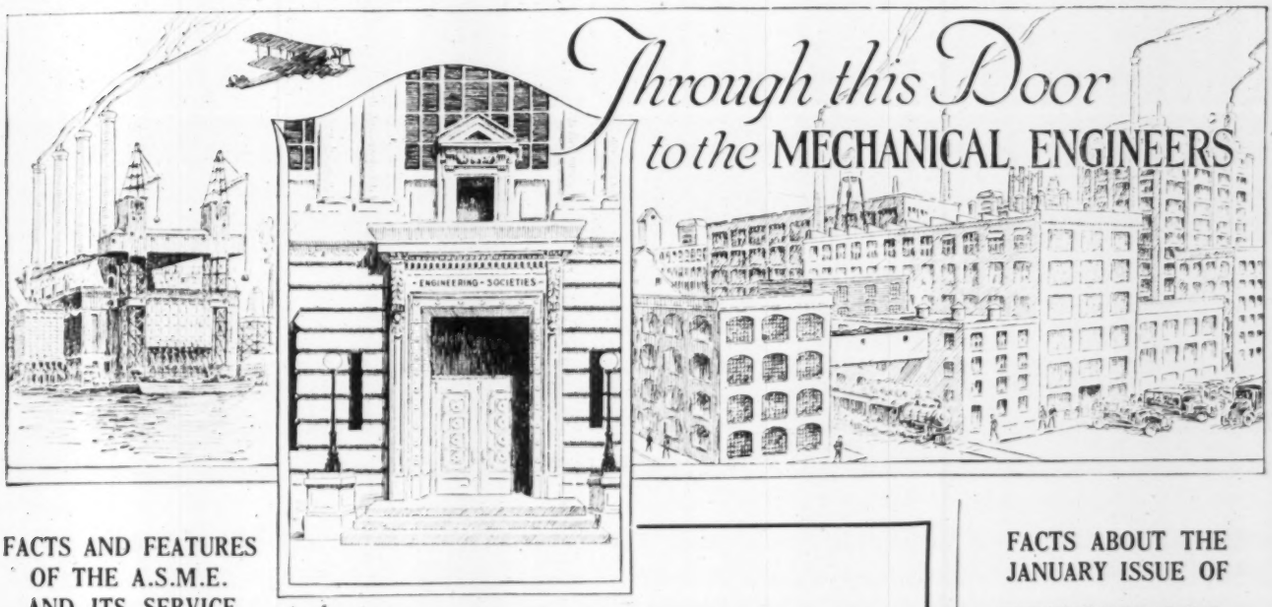
Tubing, Flexible Metallic
Breeze Metal Hose & Mfg. Co.

Tumbling Barrels
* Northern Engineering Works
* Pangborn Corporation
* Royersford Fdry. & Mch. Co.

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Jolly, J. & W. (Inc.)
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy. Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1921 Volume*



FACTS AND FEATURES OF THE A.S.M.E. AND ITS SERVICE

Membership

15,353 Members

Meetings

2 General Meetings a year, each of 4 days' duration; Annual Meeting in New York each December; 1922 Spring Meeting in Atlanta.

275 Meetings each year of Local Sections and branches in 49 industrial centers;

400 Meetings each year of Student Branches in 59 Technical Schools and Colleges.

Committees

The following Committees engage the time, thought and energy of over 1,000 members of the Society in the preparation of standards, professional papers, meetings, in research work, and in the dissemination of literature for the advancement of the engineering profession and industry:

65 Technical Committees
37 Administrative Committees
49 Local Section and Branch Executive Committees, besides numerous Special Committees in each Section
12 Professional Divisions:—Fuels, Machine Shop Practice, Management, Materials Handling, Aeronautics, Gas Power, Textiles, Power, Railroads, Cement, Ordnance and Forest Products.

American Engineering Standards Committee

The Society is a member body of this important organization for unifying methods of procedure in the development of engineering standards; and has three representatives on its main committee. Many other A.S.M.E. members are serving on sectional committees, a considerable number of which were organized under the Society's sponsorship.

American Engineering Council

The Society is represented on the Council by thirteen members and is in direct contact with national affairs of general interest to all engineers.

Library

The Joint Library of the four national societies of Civil, Mining, Mechanical and Electrical Engineers contains over 150,000 titles and the largest collection of technical periodicals in the United States. The staff comprises expert searchers and translations for verifying references; furnishes bibliographies of engineering subjects, original prints, abstracts, copies, photostats and translations; and also makes searches for patent purposes, prepares reference cards, etc. This service is confidential and is available through the mails.

Eighteen Thousand Engineers

from many industries

Who Specify or otherwise Influence the Selection of Mechanical Equipment

will be present in person or spirit at the forthcoming Annual Meeting of

The American Society of Mechanical Engineers

Time and Place

The 1921 A.S.M.E. Annual Meeting will be held as usual at the Engineering Societies Building, New York City, from December 5th to December 9th inclusive.

Program

"Elimination of Waste in Industry" will be the keynote of the meeting, and at the leading session engineers of national prominence will develop the fundamental principles of standardization and stabilization which are so essential to the fullest success of this great national movement.

Professional sessions will be devoted to specific methods of eliminating waste in Fuels, Power, Forest Products, Materials Handling, Textiles, Machine Shop Management, Railroads, Gas Power, Ordnance, Aeronautics, and Management.

The Only Complete Report

The only technical report of these inspiring sessions will be that contained in the January 1922 number of MECHANICAL ENGINEERING. It is needless to say that this report will be read with keen interest by all who attend as well as by those whose business affairs prevent their attendance, and who are thereby compelled to depend upon it for an authoritative account of the many important facts that will be brought out.

MECHANICAL ENGINEERING

Published Monthly by

THE AMERICAN SOCIETY of MECHANICAL ENGINEERS

29 West 39th Street **New York, N. Y.**

FACTS ABOUT THE JANUARY ISSUE OF MECHANICAL ENGINEERING

Circulation

The rapidly growing circulation of MECHANICAL ENGINEERING is now 20,000 a month, while additional demands for the January number will require us to print a total of at least 21,000 copies. This circulation represents in one grouping the largest number of prominent engineers identified with the selection and purchase of mechanical equipment ever recorded as readers of a monthly engineering publication.

We Can Help Prepare Your Advertisement

Our Copy Service Department is composed of men who combine advertising experience with an accurate knowledge of engineering matters, and they will be glad to coöperate in preparing copy which shall insure a satisfactory representation for your firm. Upon request, a complete advertising suggestion will be submitted for your consideration.

What Space Costs

Rates for single insertions in the January issue are as follows:

Full page.....	$115.00
Half page.....	62.00
Quarter page...	33.00

(Annual rates on application)

These rates are the same as for January of last year although the circulation of MECHANICAL ENGINEERING has been increased by 3,000 since that time.

Adequate listings of products in the Classified Index are included if order is received in time to permit of the necessary rearrangements of the Index.

Closing Date—Dec. 3, 1921

Because of the increased size of both editorial and advertising sections in the January number we cannot promise to submit proof on any copy received after December 3. Earlier copy will naturally secure more careful attention than that received at the last minute. Please make your reservation promptly and let us have copy and cuts as soon as possible thereafter.

* General Electric Co.
* Kerr Turbine Co.
* Moore Steam Turbine Corp'n
Power Turbo-Blower Co.
* Terry Steam Turbine Co.

Turbo-Blowers
Brinckerhoff, H. Gordon Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
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Power Turbo-Blower Co.

Turbo-Compressors
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Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Moore Steam Turbine Corp'n
* Terry Steam Turbine Co.

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* Moore Steam Turbine Corp'n
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

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* Washburn & Granger (Inc.)

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(See Stokers, Underfeed)

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* Lunkenheimer Co.

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* Lidgerwood Mfg. Co.

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(See Pans, Pumps, Traps, etc., Vacuum)

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* Jenkins Bros.
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(See Circulators, Filters, Gages, Heaters, Meters, Strainers, etc., Water)

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(See Turbines, Hydraulic)

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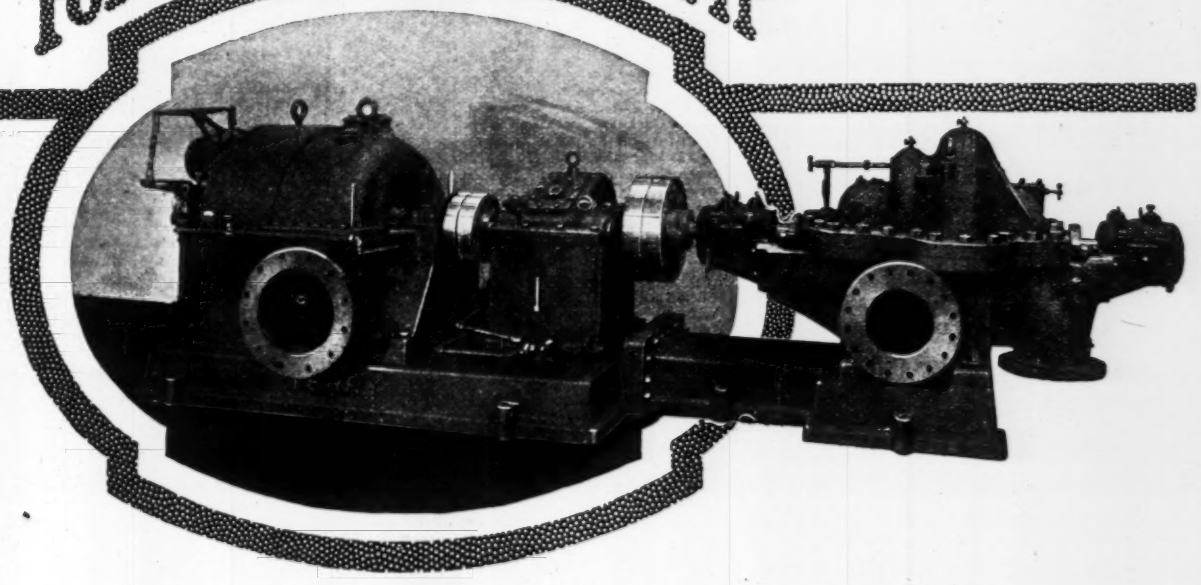


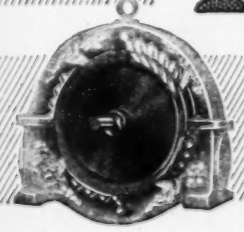
TURBINE drive permits extreme flexibility of control and also avoids provision against detrimental overloading which is necessary with motor driven centrifugal pumps. As it is impossible to overload a Terry Turbine, any difficulty of this sort is avoided for, as the power demand increases, the speed of the turbine is lowered, thereby automatically compensating for a decrease in the discharge head.

The above illustration shows a geared condensing turbo pump unit for water works service.

You will combine high efficiency, reliability, small space and low upkeep cost in your pump unit, if you specify—

T-740

THE TERRY TURBINE



Offices in Principal Cities in U.S.A. also in Important Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.

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	*Wheeler, C. H. Mfg. Co.	53
	*Wheeler Condenser & Engrg. Co.	—
	*Whitney Mfg. Co.	60
	*Wickes Boiler Co.	17
	*Wood's, T. B. Sons Co.	56
	*Worthington Pump & Machinery Corp'n	—
Y	*Yale & Towne Mfg. Co.	—
	*Yarnall-Waring Co.	42

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1921 Volume*

Two Speed Operation–No Loafing on the Job!

The low speed is for cutting and mixing sand. The higher speed for traveling from one sand pile to another in the foundry.

This Watson Ball-Bearing Multi-Speed Motor—with two speeds—keeps the machine on the job, constantly working at greatest efficiency under severe conditions of service. The motor operates at 600 and 1800 R. P. M. Has extra large bearings, enclosed to keep out sand and dust. Grease lubricated—needs little attention. Rugged construction—a motor built for long life and uninterrupted operation.

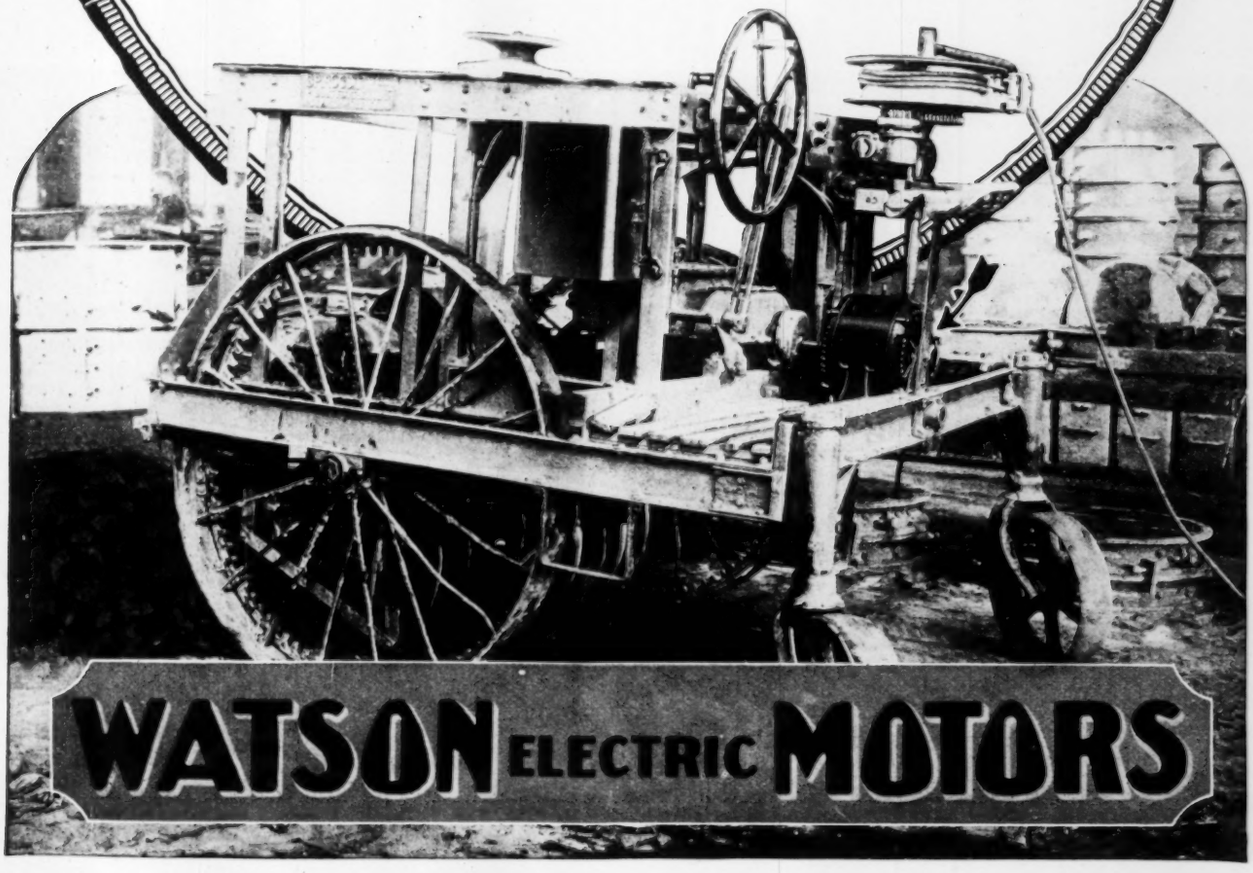
Briefly, those are the reasons why the Wadsworth Corporation of Cleveland chose this Watson Motor to operate the machine illustrated. Watson engineers co-operated to determine accurately which Watson Motor was best fitted to the needs of the machine and the work required of it.

The co-operation of Watson sales engineers is an important factor in the success of Watson Motor installations. We are willing to shoulder the responsibility of fitting the motor to its work. Misapplication is the cause of the failure of many a good motor. Watson Service guards against that absolutely.

Consult our nearest district office.

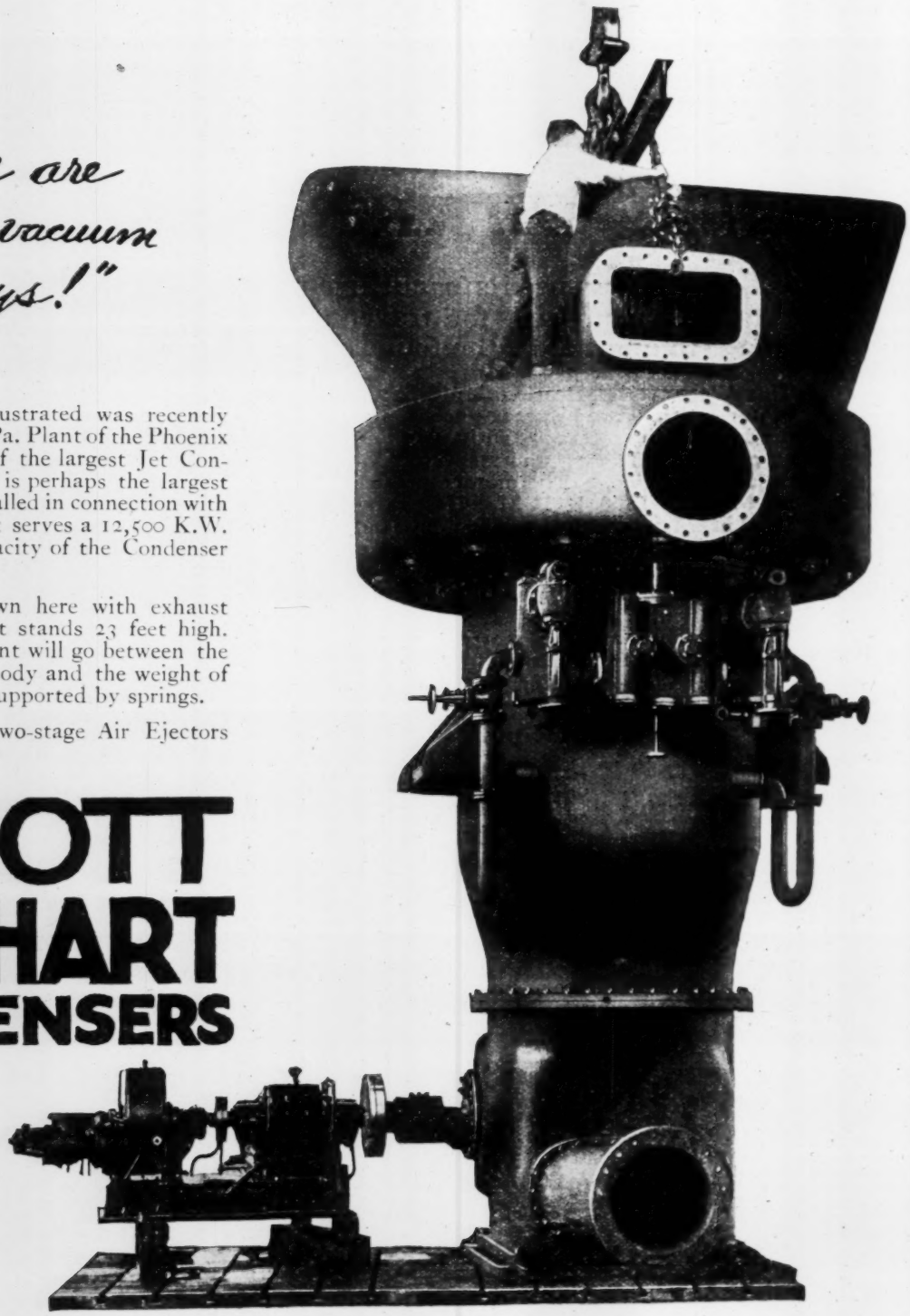
The Mechanical Appliance Co., Milwaukee, Wis.

Buffalo	Detroit	Philadelphia	Boston	Dallas	St. Louis
Chicago	Grand Rapids, Mich.	Pittsburgh	Burlington, Ia.	Los Angeles	Toronto
Cincinnati	Minneapolis	Amherst, N. S.	Des Moines	San Francisco	Winnipeg
Cleveland		Atlanta	High Point, N. C.	New York	



WATSON ELECTRIC MOTORS

"These are high vacuum days!"



The Jet Condenser illustrated was recently built for the Harwood, Pa. Plant of the Phoenix Utility Co. It is one of the largest Jet Condensers ever built, and is perhaps the largest Jet Condenser ever installed in connection with spray pond service. It serves a 12,500 K.W. turbine, the water capacity of the Condenser being 18,000 G.P.M.

The Condenser is shown here with exhaust connection in place. It stands 23 feet high. A rubber expansion joint will go between the Condenser and pump body and the weight of the Condenser will be supported by springs.

Two Elliott-Ehrhart two-stage Air Ejectors handle the air removal.

ELLIOTT EHRHART CONDENSERS

C-229

Condensers
Air Ejectors
Deaerators
Twin Strainers
Twin Filters
Feed Water Heaters
Steam Separators
Receiver Separators
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ELLIOTT COMPANY

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GENERAL SALES OFFICES: JEANNETTE, PA.

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Both were Tested
READING
Stood the Test

In designing the ZR-2 it was necessary to figure on stresses of a nature but little understood, and in the construction to use alloys so recently developed that their physical properties are not surely known. The disastrous end of one of the big dirigible was the lot of the Pioneer.

In installing Reading Steel Fittings in the Power Plant of the Naval Air Station at Lakehurst, N. J., there was no pioneering. Reading has specialized for years in Steel Pressure Castings. Time and difficult service conditions have proven the reliability and freedom from porosity of Reading Fittings.

Shipments are made from stock of all standard sizes and shapes.

Catalogue on request

See Our Data in 1921 A.S.M.E. Cond. Catalogues of Mechanical Equipment

READING VALVE & FITTINGS CO.

READING, PA.

BOSTON	PHILADELPHIA	CLEVELAND
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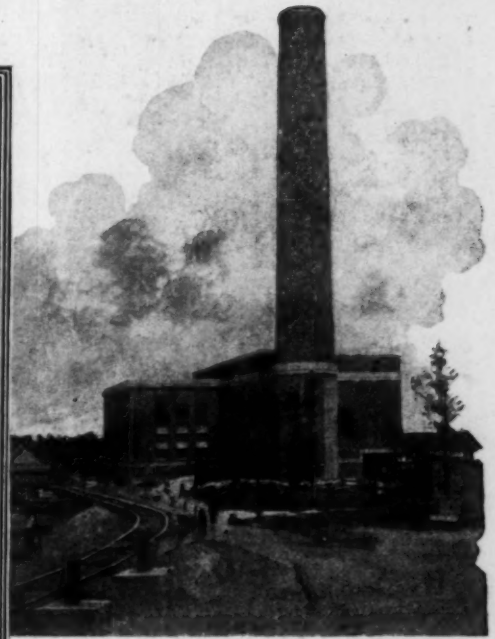
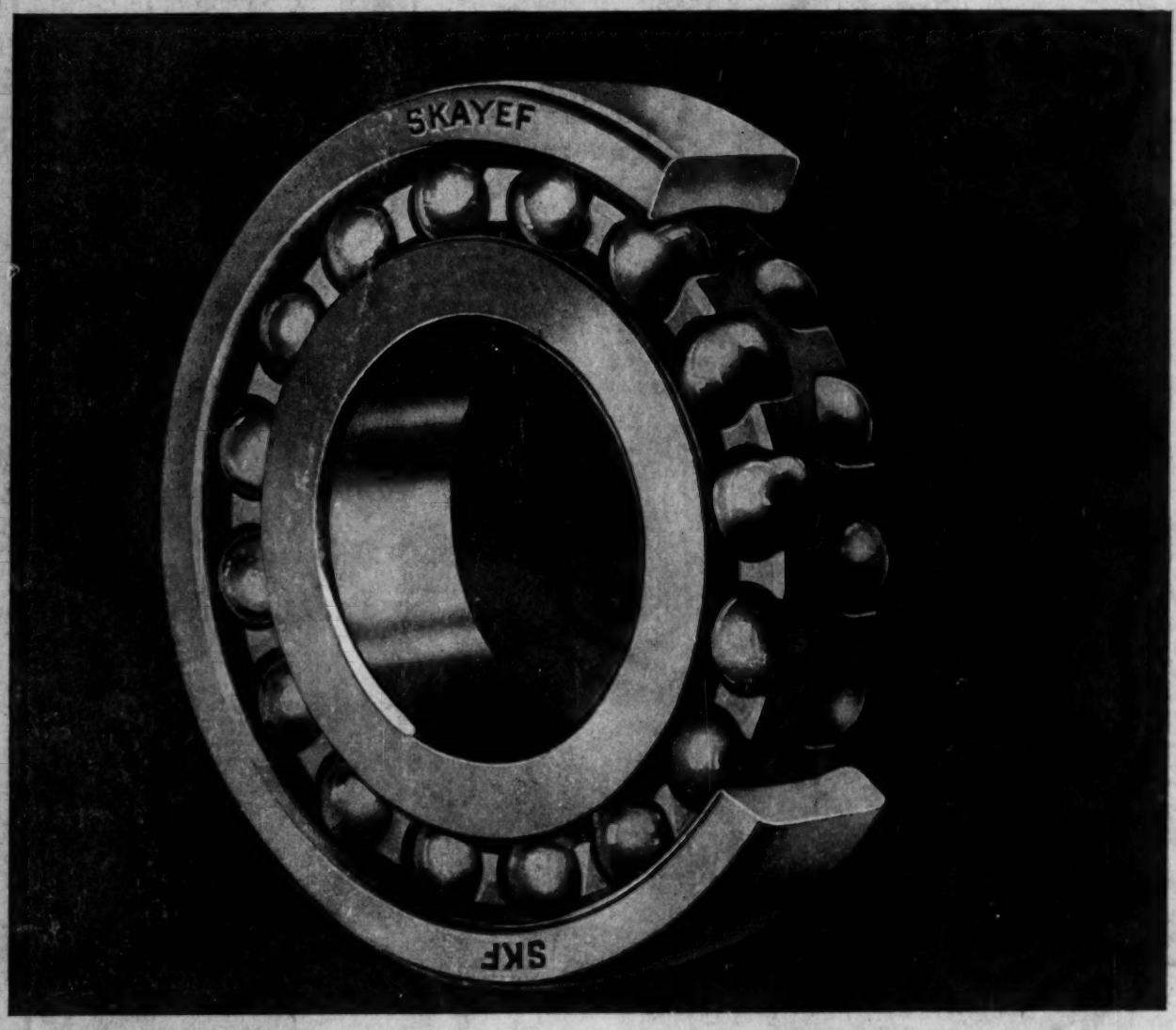


Naval Air Station Power Plant equipped with Reading Steel Fittings by the Lord Construction Co.

Hangar constructed to receive ZR-2. To appreciate size note automobiles in foreground.

U. S. Navy Official Photographs From Underwood and Underwood

Specify READING OPEN HEARTH STEEL FLANGES & FITTINGS



The modern, highly developed, self-aligning ball bearing

is due to the world-wide studies of SKF engineers, and the experience of The Skayef Ball Bearing Co. These made possible the development of the Self-Aligning bearing, whose special function besides carrying radial loads, is to compensate for shaft misalignment.

The entire engineering experience of our organization is at your disposal. You are urged to submit your bearing problems to us for careful and impartial consideration.

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